Stavis Seafoods, Inc.

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"Fish Pier West" Boston, MA 02210
Phone: 617-482-6349 Fax: 617-482-1340
www.stavis.com

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

MANAGEMENT SYSTEM

STAVIS SEAFOODS, INC.
7 CHANNEL ST
BOSTON, MA 02210

Date:
7/22/2013

Ammonia Refrigeration Management (ARM) Program Responsibilities

Section	Responsible Person
2. Overall Program Manager	Brian Caron
3. Refrigeration System Documentation	American Refrigeration Company
4. Operating Procedures	Brian Caron / Gary Hardin
5. Preventive Maintenance Program	Brian Caron
6. Contractor Program	American Refrigeration Company
7. Emergency Response Program	American Refrigeration Company / LERC
8. Incident Investigations Procedures	Brian Caron / Gary Hardin
9. Training Program	Gary Hardin / Brian Caron
10. Hazard Review Procedures	Brian Caron / Gary Hardin
11. Refrigeration System Change Procedures	Brian Caron

TITLE: **MANAGEMENT SYSTEM**

PURPOSE:

The purpose of the management system is to identify personnel responsible for the Ammonia Refrigeration Management Program, and the extent of their participation in operating, and maintaining the system to include collecting data to be used in reviews.

SCOPE:

All employees involved or potentially involved in the ammonia refrigeration process should be aware of the Ammonia Refrigeration Program and its policies and procedures.
Those employees directly involved with the operation and maintenance of the ammonia refrigeration system should be intimately involved with the development and execution of the Ammonia Refrigeration Program, and should have input as policies and procedures are established. All involved employees should have ready access to all ammonia refrigeration management files and documents.

The Facility Manager shall:

- Collect, verify, and update all refrigeration system documentation.
- Decide which tests and inspections shall be included in the preventive maintenance program.
- Participate in drills conducted to evaluate the Emergency Response Program.
- Participate in incident investigations.
- Participate in hazard reviews.
- Decide what topics should be included in the training program.

The Stavis Seafoods Ammonia Refrigeration Management Program will be reviewed every five years or if there have been changes in personnel or frequent ammonia releases at the facility.

The program review shall consist of visual inspections of the ammonia refrigeration system, meeting with system operators, reviews of program documentation. All recommendations identified during the review shall be addressed as part of the follow-up activities. All documentation associated with the program review shall be kept in the Ammonia Refrigeration Management files until the next program review is completed.

The following personnel are responsible for the Stavis Seafoods Ammonia Refrigeration Management Program:

Brian Caron (Facility Manager / System Operator)
American Refrigeration Company (System Operator)
Gary Hardin (Regulatory Affairs Manager)

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM

REFRIGERATION SYSTEM DOCUMENTATION

EQUIPMENT LIST

Equipment ID	Manufacturer	Model No.	Serial No.	Operating Volume	Maximum Allowable Pressure	Minimum Design Temperature
AU-1	Krack	PCS2 – DXA - HGU		7.8 TR	N/A	N/A
AU-2	Krack	PCS2 – DXA - HGU		7.8 TR	N/A	N/A
AU-3	Krack	PCS2 – DXA - HGU	7625A	7.8 TR	N/A	N/A
AU-4	Krack	BTR-34-DXA		1.19 TR	N/A	N/A
AU-5	Krack	BTR-56-DXA-HGU		2.54 TR	N/A	N/A
AU-6	Krack	BTR-56-DXA-HGU		2.54 TR	N/A	N/A
AU-7	Krack	BTR-58-DXA-HGU		3.36 TR	N/A	N/A
AU-8	Krack	BTR-58-DXA-HGU		3.36 TR	N/A	N/A
AU-9	Krack	DTX4S-DXA-A		3 TR	N/A	N/A
AU-10	Krack	DTX4S-DXA-A		3 TR	N/A	N/A
AU-11	Krack	DTX-35-1025-DXA-HGU		2.3 TR	N/A	N/A
AU-12	Krack	DTX-35-1025-DXA-HGU		2.3 TR	N/A	N/A
AU-13	Krack	DTX-35-1025-DXA-HGU		2.3 TR	N/A	N/A
AU-14	Krack	DTX-35-1025-DXA-HGU		2.3 TR	N/A	N/A
AU-15	Krack	DTX25-680-DXA-HGU		1.5 TR	N/A	N/A
AU-16	Krack	DTX25-680-DXA-HGU		1.5 TR	N/A	N/A

STAVIS SEAFOODS, INC.

EQUIPMENT LIST

Equipment ID	Manufacturer	Model No.	Serial No.	Operating Volume	Maximum Allowable Pressure	Minimum Design Temperature
Jacket Pump 1	Gould	3642	IBF 10334	40 gpm		
Jacket Pump 2	Gould	3642	IBF 10332	40 gpm		
Condenser Pump 1	Gould	3856	4BF1K5F0	240 gpm		
Condenser Pump 2	Gould	3856	4BF1K	240 gpm		
RC-1	mycom	N 4 R	17418	52.7 TR	250 psig	
RC-2	mycom	N 4 WB	MB4126	52.7 TR	250 psig	
RC-3	mycom	N 8 WB	832756	107.5 TR	250 psig	
RCB -1	mycom	N 6 B	17455	28 TR	150 psig	
RCB-2	mycom	N 6 B	17454	28 TR	150 psig	
Cont. Pres Receiver	RVS	24 X 130 CPR		9.38 .	250 psig	-20 @ 250 psig
Pilot Receiver	RVS	20 X 60		5.45	250 psig	-20 @ 250 psig
Low Temp Accumulator	RVS	24 X 96		9.38	150 psig	-20 @ 150 psig
Transfer Drum	RVS	24 X 36		9.42		
High Temp Accumulator	RVS	48 X 120		37.43	250 psig	50 @ 150 psig
Intercooler	RVS	24 X 120		9.38	250 psig	-20 @ 250 psig

EQUIPMENT LIST

Equipment ID	Manufacturer	Model No.	Serial No.	Operating Volume	Maximum Allowable Pressure	Minimum Design Temperature
Condenser 1	B.A.C. / Frick	XLP-2-712-276	41-469457-01-01-01	183 TR	250 psig	
Exhaust Fan Engine Room	Green Heck	Taub – 36h - 50	05B19129	18010 scfm	N/A	N/A
Exhaust Fan #2	Green Heck	Cube – 180 – hp - 4	05B21816	6400	N/A	N/A
Ice Machine #1	Howe	75RLR	F4827	5 TR	N/A	N/A
Ice Machine #2	Howe	75RLR	F4826 075E05	5 TR	N/A	N/A

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Relief System Design

Relief Device Location	Manufacturer	Model No.	Inlet and Outlet Sizes (inches)	Set Pressure (psig)	Relief Capacity (lb/min or scfm)
Compressor # 1 H RC 1	Hansen	H5602	¾ / 1"	300	913 scfm
Compressor # 2 H RC 2	Hansen	H5602	¾ / 1"	300	913 scfm
Compressor # 3 H RC 3	Hansen	H5602	¾ / 1"	300	913 scfm
RCB 1	Cyrus Shank	804	¾ / 1"	300	1047 scfm
RCB 2	Cyrus Shank	804	¾ / 1"	300	1047 scfm
Intermediate Pressure Vessel	Rego (2)	AA 3130 150	¾ / 1"	150	1020 scfm
[illegible]rol [illegible]ssure Receiver	Hansen (2)	15602	¾ / 1"	300	913 scfm
High Temp Accumulator	Hansen (2)	H 5602	¾ / 1"	250	769 scfm
Low Temp Accumulator	Rego (2)	AA 3130 150	¾ / 1"	150	1020 scfm
Pilot Receiver	Rego (2)	AA 3130 A 250	¾ / 1"	250	1706 scfm
Oil Pot #1	Rego	AA3130 150	¾ / 1"	150	1020 scfm
Oil Pot #2	Parker	SRH1	¾ / 1"	150	464 scfm
Oil Pot #3	Hansen	H5602	¾ / 1"	250	769 scfm
Transfer Drum	Rego	AA 3130 A 250	¾ / 1"	250	1706 scfm

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Safety Systems

Equipment	Safety Systems
Ammonia Compressors	Each compressor is equipped with the following safety cutouts: High discharge pressure cutout: 250 psig
	Low suction pressure cutout: 15 hg psig
	Low oil pressure cutout: 30 psig
	High discharge temperature cutout: 200 °F
Evaporative Condensers	The evaporative condenser fans and cooling water pumps are controlled by: M&M Panel
Intermediate Pressure Vessel	High level alarm: 80 %
	High level compressor cutout: 90%
Low Pressure Vessel	High level alarm: 80%
	High level compressor cutout: 90%
Cooler # High Room Temperature Alarm	40 °F
Freezer #1 High Room Temperature Alarm	10 °F
Main Liquid Shut-Off Valve (King Valve)	The king valve is located: Above the CPR. / Above Low Temperature Accumulator
Emergency Stop Button	The emergency stop button is located Outside of Mechanical Room Hitting the button will: Shut down all compressors, condensers, And evaporators.
Ammonia Detectors	Ammonia detectors are located: Engine Room / Coolers A & B, Freezer, Dock, & Vent Line. The detectors will alarm at : 25 ppm, Engine Room 50 ppm, Vent Line 250 ppm
Ammonia Compressor Room Ventilation	The ammonia detectors will automatically turn on the ammonia machinery room ventilation fans if ammonia concentrations above 25 ppm are detected. The ventilation fans can be turned on manually using switches located: On the M&M Panel

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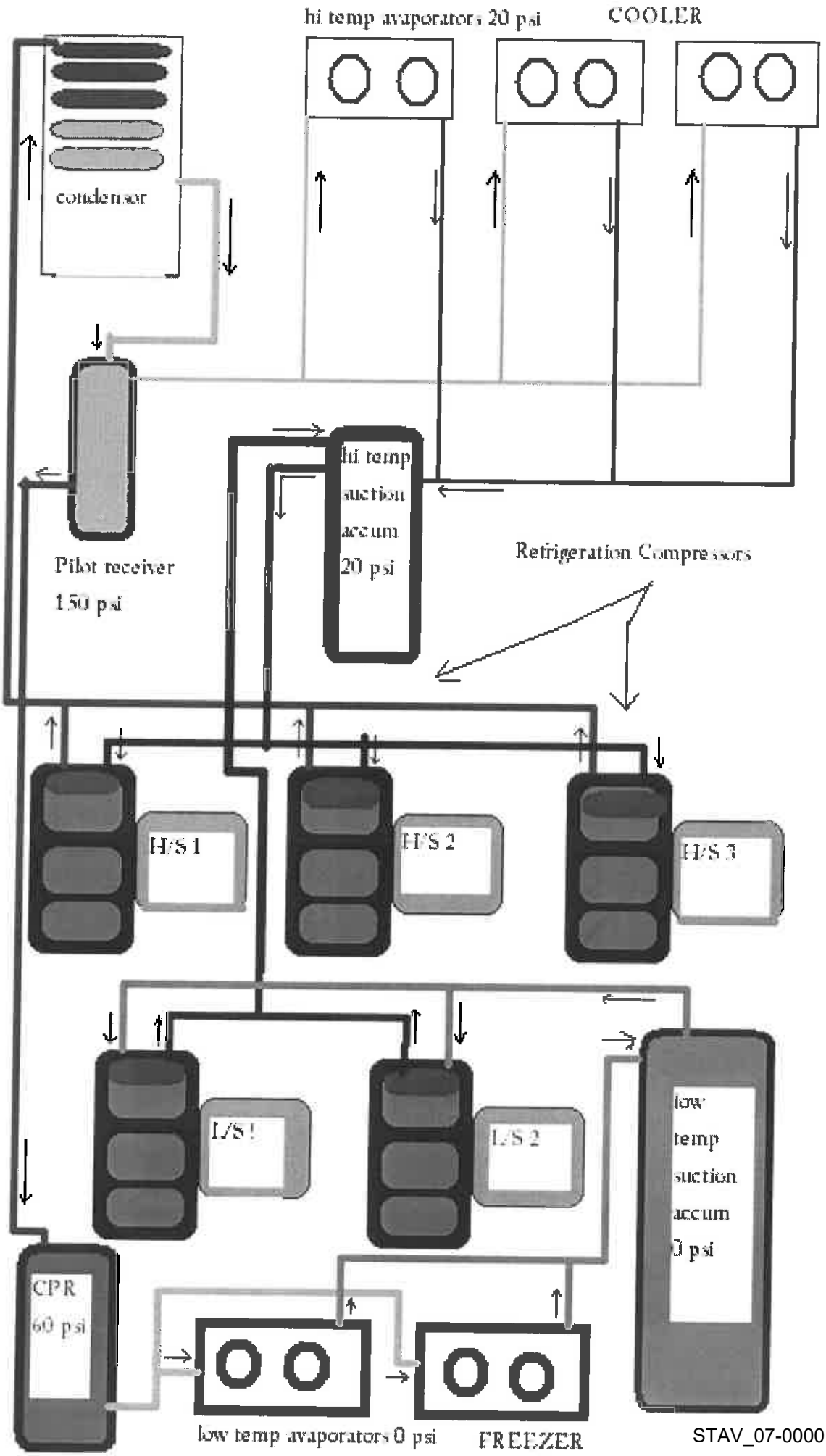
Desired System Operating Ranges

System Parameters	Desired System Operating Ranges	Troubleshooting Procedures (If Outside Desired Ranges)
Low Side Compressor Lube Oil Pressures	40 to 50 psig	1. Check the lube oil levels 2. Make sure the lube oil pump is working 3.Make sure the manual valves in lube oil system are open 4. Check the lube oil filter
High Side Lube Oil Pressure	50 to 65 psig	1. Check to make sure the compressor cooling system is functioning. 2. Make sure the compressor lubrication oil system is working properly.
High Side Compressor Lube Oil Temperatures	90 to 110 °F	3. Check to make sure that slugs of liquid ammonia are not being sent to the compressor.
Lowside Discharge	25 to 35 psig	1. Inspect and/or adjust low stage compressor as necessary. 2. Adjust the low side loads (freezers) as necessary. 3. Make sure appropriate manual valves are open.
Low Side (Suction) Pressure	3 hg to 0 psig	4. Make sure the level is being maintained in the low side vessel.
High Side Suction Pressure	25 psig to 35 psig	1. Check condenser fans and cooling water pumps. 2. Inspect/repair cooling water spray nozzles. 3. Check condenser coils for rust, ice, or scale.
High Side Discharge (or Head) Pressure	120 to 160 psig	4. Check for air in the system and adjust the auto purger if necessary.

STAVIS SEAFOODS, INC.

Desired System Operating Ranges

System Parameters	Desired System Operating Ranges	Troubleshooting Procedures (If Outside Desired Ranges)
High Temp Receiver Level	33 %	1. Check the levels in the other ammonia vessels. 2. Check the evaporative condensers for liquid hang-up. 3. Inspect the system for leaks.
Intermediate Pressure Vessel Level	33 %	1. Make sure that the level control system on the vessel is functioning. 2. Make sure all the manual valves associated with the vessel are open. 3. Check for liquid carry-over from the intermediate side loads (chillers and coolers).
Low Temp Vessel Level	33 %	1. Make sure that the level control system on the vessel is functioning. 2. Make sure all the manual valves associated with the vessel are open. 3. Check for liquid carry-over from the low side loads (freezers).
Cooler # A Room Temperature	33 to 38 °F	1. Check the pressure in the intermediate vessel. 2. Make sure all the manual valves associated with the cooler are open.
Cooler # B Room Temperature	33 to 38 °F	1. Check High Temp Pressure Vessel 2. Make sure all manual valves associated with cooler are open
Freezer # Room Temperature	-5 to 5 °F	1. Check the pressure in the low side vessel. 2. Make sure all the manual valves associated with the freezer are open. 3. Make sure that the coils are not covered with ice or dirt. 4. Make sure the fans are operating. Make sure the defrost cycle is working properly
CPR Pressure	50 to 60 psig	1. Make sure that the level control system on the vessel is functioning. 2. Make sure all the manual valves associated with the vessel are open. 3. Check for liquid carry-over from the intermediate side loads (chillers and coolers).



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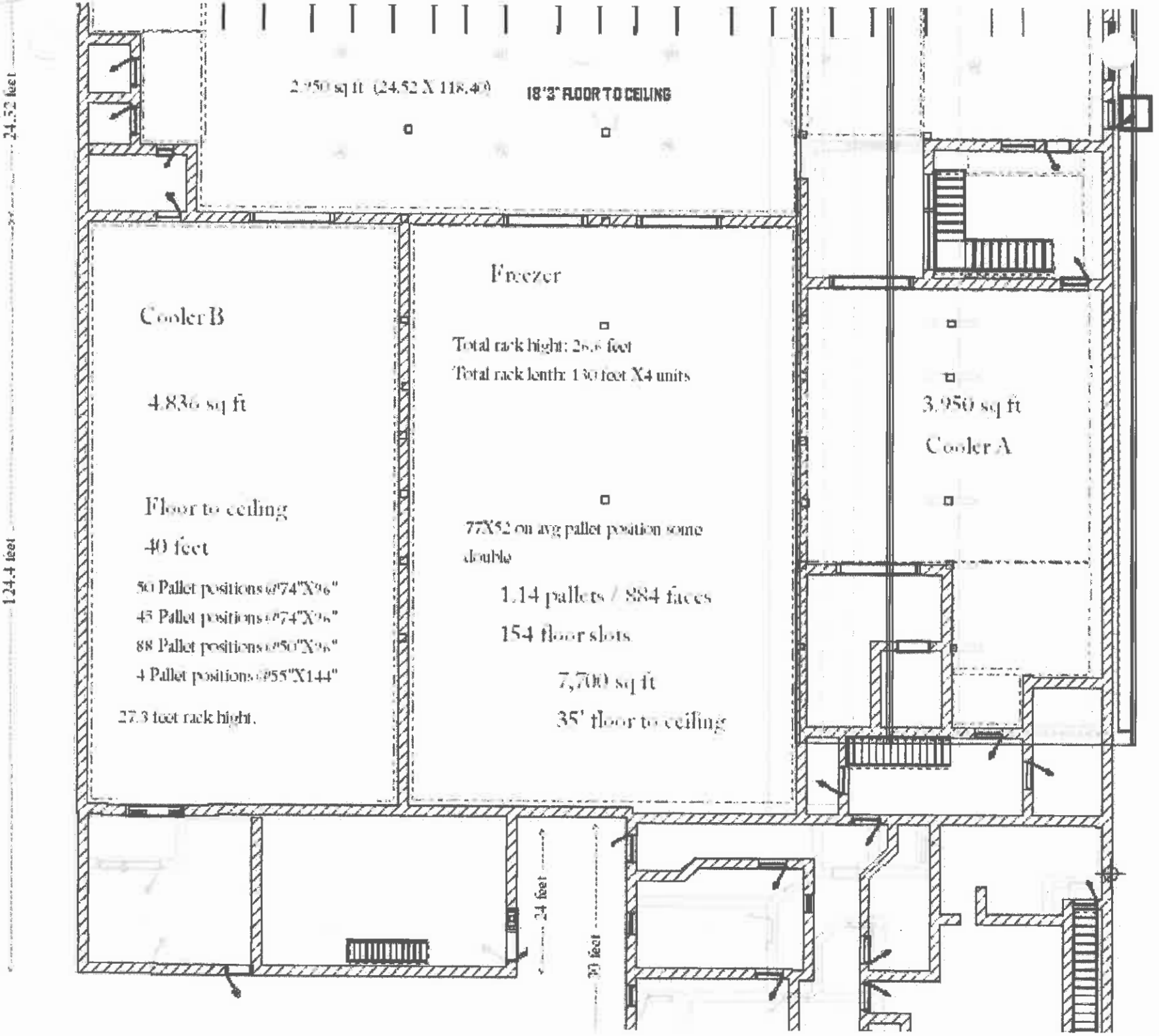

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AMERICAN REFRIGERATION COMPANY, INC.
149 River Street, Suite 3 • Andover, MA 01810
Tel: 978 • 474 • 4000 Fax: 978 • 474 • 4001 Toll Free: 888 • 388 • 1120

System Operating Charge

Date: 7-Sep-09
Customer: Stavis Seafoods
Site Address: 7 Channel Street
Boston, MA

Item #	Description	Manufacturer	Model # / Size	Operating volume	Ammonia Density	Operating Charge	
CPR1	Cont. Pres. Rec	RVS	24 x 128	9.38	37.74	354.12	
EC1	Evap. Cond	Imeco	XLC-220			238.00	(Per MFG)
IC1	Intercooler	RVS	24 x 120	9.38	40.43	379.36	
IM1	Ice Machine		5 ton			26.00	(Per MFG)
IM2	Ice Machine		5 ton			26.00	(Per MFG)
OP1	Oil Pot		6 x 30	0.49	37.74	18.53	
OP2	Oil Pot		6 x 30	0.49	40.43	19.85	
PR1	Pilot Rec.	RVS	20 x 60	5.45	36.95	201.37	
SA1	Suction Acc.	RVS	24 x 96	9.38	42	394.09	
TS1	Transfer System	RVS	24 x 36	9.42	42	395.84	
SA2	Suction Acc.	RVS	48 x 120	37.73	40.2	1516.86	
IM 3	Ice Machine		10 ton			80.00	(Per MFG)
AU1	Evaporator	Krack	PCS2-DXA-HGU	7.8	42	81.90	0.25
AU2	Evaporator	Krack	PCS2-DXA-HGU	7.8	42	81.90	0.25
AU3	Evaporator	Krack	PCS2-DXA-HGU	7.8	42	81.90	0.25
AU4	Evaporator	Krack	BTR-36-DXA-A	1.19	40.2	11.96	0.25
AU5	Evaporator	Krack	BTR-56-DXA-HGU	2.54	40.2	25.53	0.25
AU6	Evaporator	Krack	BTR-56-DXA-HGU	2.54	40.2	25.53	0.25
AU7	Evaporator	Krack	BTR-58-DXA-HGU	3.36	40.2	33.77	0.25
AU8	Evaporator	Krack	BTR-58-DXA-HGU	3.36	40.2	33.77	0.25
AU9	Evaporator	Krack	DTX4S-DXA-A	3	40.2	30.15	0.25
AU10	Evaporator	Krack	DTX4S-DXA-A	3	40.2	30.15	0.25
AU11	Evaporator	Krack	DTX3S-1025-DXA-HGU	2.3	40.43	23.25	0.25
AU12	Evaporator	Krack	DTX3S-1025-DXA-HGU	2.3	40.43	23.25	0.25
AU13	Evaporator	Krack	DTX3S-1025-DXA-HGU	2.3	40.43	23.25	0.25
AU14	Evaporator	Krack	DTX3S-1025-DXA-HGU	2.3	40.43	23.25	0.25
AU15	Evaporator	Krack	DTX2S-680-DXA-HGU	1.5	40.43	15.16	0.25
AU16	Evaporator	Krack	DTX2S-680-DXA-HGU	1.5	40.43	15.16	0.25
						4209.87	

Piping

	Duty	Line Size	Volume / Lin. Ft.	Lineal Feet	Ammonia Density	Operating Charge	
CD	Cond. Liq. Ret.	2"	0.0205	60	36.95	18.18	0.4
SCL	Sub-cooled Liq.	1-1/4"	0.0089	140	37.74	47.02	
		3/4"	0.003	80	37.74	9.06	
HPL	High Pressure Liq.	1-1/4"	0.0089	120	36.95	39.46	
		3/4"	0.003	160	36.95	17.74	
		1/2"	0.0016	60	36.95	3.55	

Liquid Piping	135.01
Total piping	135.01
Contingency	1000.00
Total Est. Charge	5344.88

STAV_07-000016

R	L	V
1	2	9.38318
1	2	9.38318
0.25	2.5	0.490873
0.25	2.5	0.490873
0.833	2.5	5.449787
1	2	9.38318
1	3	9.42477
2	2	37.73272

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM

OPERATING PROCEDURES

STAVIS SEAFOODS, INC.

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

STANDARD OPERATING PROCEDURES — AMMONIA UNLOADING (LOAD-IN) PROCEDURE

Ammonia Unloading Procedure (Load-in Procedure)

Objective	This procedure is established to set forth Standard Operating Procedures (SOPs) for unloading ammonia from a tank truck to the ammonia refrigeration system.
Purpose	The purpose of the SOP is to provide the procedures for safely unloading ammonia to the ammonia refrigeration system.
Concerns	Careful attention to the level of ammonia in the high-pressure receiver and the condition of the unloading hose, which should be verified to be with in date and is approved for ammonia work. It is important to this procedure because a release of ammonia can occur. Among the incidents we are trying to prevent are: Injury to operator(s) during the ammonia unloading procedure Potential fire and explosion due to formation of a flammable atmosphere and providing an ignition source
Department	**Maintenance**
Operator/ Responsibility	**Facility Manager —~~Nick Rittere~~** Tanner Lind/Brian Carson
Equipment	Main liquid ammonia intake port is located on the controlled pressure vessel, (CPR).
Location	Southwest corner of the building in controlled pressure vessel, (CPR) room.
Related documents	Inspection and Maintenance Records — **in the Facility Manager's office.** System Log Book — **In the Facility Manager`s office.** Manufacturer's Installation and Operations documents — **in the Facility Manager`s office** Block Diagrams — **in the PSM/RMP Program document —Facility Managers office.** P&IDs - **in the PSM/RMP Program document — Facility Managers office.** Ammonia MSDS — **in Right to Know notebook located in the hall at battery charging station.** **Copies of all documents — Facility Managers office.**
Initial development date	October 2014
Authorized by	
Revision	**No.** 0
Annual Review by	

Original Date:_____

Revision Date:_____

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

STANDARD OPERATING PROCEDURES — AMMONIA UNLOADING (LOAD-IN) PROCEDURE

Standard Operating Procedure (SOP)

Task Flow

Preparation

Assemble equipment

Ammonia unloading procedure

Task	Step	Comment
Preparation	1. Be familiar with the emergency response procedures for the facility.	
	2. Know the location of the nearest eye wash/safety station.	
	3. Know the location of the valves, which would have to be closed to isolate the line/equipment in an emergency.	
	4. Be familiar with ammonia first aid procedures.	
	5. Be familiar with the line and equipment opening procedures (SOP7).	
Assemble equipment	Before going to the ammonia unloading procedure, assemble the following equipment: • Elbow-length rubber gloves • Splash goggles and face shield • Clean bucket containing water or quick access to a water hose. • Closed valve markers and locks • Emergency service bucket containing a full face type gas mask, eye wash bottle, pipe wrench	
Ammonia unloading procedures	1. Notify personnel and supervisors in the area that ammonia-unloading procedures are to be carried out.	
	2. Ensure that a backup person (buddy-system), **in addition to the delivery tank truck driver,** is available for the remainder of these procedures.	
	3. Check the documents provided by the delivery tank truck to ensure delivery of the correct grade and purity of ammonia.	
	4. Ensure that the driver of the tank truck has pulled the tank truck as close as possible to the unloading line to minimize the potential for accidents.	
	5. Ensure that the delivery truck driver locks the truck's brakes and chocks the wheels. Use yellow caution tape to isolate the area. Use cones to protect hose from any vehicle traffic.	

Original Date:_____

Revision Date:_____

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

STANDARD OPERATING PROCEDURES — AMMONIA UNLOADING (LOAD-IN) PROCEDURE

	6. Allow the delivery person to use his checklist to check	
	7. **Slowly** remove the cap from the unloading line at the controlled pressure receiver (CPR). Install proper adaptor for liquid hose. CPR 1-19	
	8. Work with delivery driver as required. Unroll the ammonia hose and inspect it carefully for cracks or other signs of wear that could result in hose failure and to ensure it is rated for ammonia service and verify that it is with in date. Never use a hose that is in poor condition or that is not rated and is verified safe and in date for ammonia service.	
	9. When you have completed the above steps, give the go ahead to the delivery person that he may connect the hose to the tank truck and to the unloading line.	
	10. Plant engineer or plant operator should monitor the delivery person as he closes the bleed valve on the unloading hose.	
	11. Open the valve in the unloading line at the CPR and the manual valves on the tank truck.	
	12. Monitor closely as truck pump is started and begin unloading ammonia to the CPR. Verify that the pump flow direction indicator shows proper flow direction. Be sure to monitor the levels in the controlled pressure receiver and in the tank truck.	
	13. When the ammonia unloading is completed, close the unloading valve located on the tank truck first and then close the valve located on the CPR.	
	14. See that the pump down system on the truck is used to pump down any residual ammonia in the unloading hose back to the truck.	
	15. Open the bleed valve to drain any residual ammonia in the unloading hose into a bucket of water. When there is no more ammonia in the hose, close the bleed valve and disconnect the bleed hose and the unloading hose.	
	16. Wait approximately 10 min. to let any residual oil drip off the unloading line. Then replace the cap on the unloading line.	
	17. Be sure to monitor the level in the high pressure receiver over the next several hours.	
	18. After the work is completed, notify the area personnel, the supervisors, and the backup personnel.	

Original Date:_____

Revision Date:_____

AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Operation of Mycom Reciprocating Compressors Model

Objective	This procedure is established to describe the Technical Operating Specifications (TOS) and to set forth Standard Operating Procedures (SOP) for the operation of Mycom N4b / N4Wb / N8WB
Purpose	The purpose of the TOS is to provide a description of the compressor, define its function, operating conditions and limits, consequences of deviations from operating limits, describe its controls, instrumentation and safety systems and set its operating alignment(s). The purpose of the SOP is to establish the proper steps for startup, operation, and shut-down of the compressor.
Concerns	Careful attention to suction and discharge pressure, and lubrication oil temperature are important to this procedure because compressor damage can occur when compressors are dead-headed or when lubrication is lost. Among the incidents we are trying to prevent are: • Injury to operator(s) • Damage to compressors due to high discharge pressure or loss of lubrication • Over-pressurization of the refrigeration system (e.g., blocked in liquid) resulting in a release through pressure relief valves or failure or rupture of lines, tubes, or other equipment and a subsequent release
Department	**Facilities**
Operator/ Responsibility	**Facility Manager — ~~Nick Buttera~~** Brian Caron **Plant Manager**
Equipment/Location	*(1)* Mycom N4B / N4WB / N8WB Located in the Mechanical Room in the north half of the building.
Related documents	Inspection and Maintenance Records — in the Plant Engineer's office. System Log Book — in the Plant Engineer's office. Manufacturer's Installation and Operations documents — in the Plant Engineers office. Block Diagrams — in the PSM/RMP Program document —Plant Engineers office. P&IDs - in the RMP Room / Quality Assurance Office.Program document— Facility Managers office / Mechanical Ammonia MSDS — Outside Facilities Office Copies of all documents — Facility Managers office.
Initial SOP development date	B C
Authorized by	~~Nick Butt~~era / Gary Hardin
Revision	No. 0
Annual Review by	
Annual Review by	

Original Date:_____

Revision Date:_____

AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Technical Operating Specification (TOS)

Function The compressor is a pump to maintain desired suction pressure on a refrigeration system by removing ammonia vapor from the (refrigeration, icemaker) (circle one) (liquid recirculator, evaporator, icemaker, accumulator)(circle one). In the process, low-pressure ammonia vapor is compressed which creates heated high-pressure ammonia vapor. The high-pressure ammonia vapor is simultaneously pumped to the evaporative condensers where it is liquefied. The compressor oil is cooled via by a water-cooled, shell and tube heat exchanger mounted to the side of the compressor. The oil is pumped from the compressor oil pump through the shell and water is pumped through the tubes. The water absorbs the heat from the oil, and is then routed through the cylinder heads and, having been supplied from the (condenser, fresh water line) (circle one) continues to the (condenser, drain) (circle one). The cool oil flows from the oil cooler into the seal housing, through the crankshaft to the rod and main bearings and returns to the crankcase sump. System suction pressure is maintained in the desired range by means of (pressure switches, or transducers) (circle one) acting upon unloaders and/or the compressor starter.

Description	Capacity/Size	Operating Limits	Deviations/Consequences
Mycom N4B / N8BWB	**"X"HP** (Replace "X" with motor horsepower rating as noted on the nameplate) "X"TR (Replace "X" with compressor rating at operating pressure conditions)	Desired Suction pressure: 15 -25 psig (Indicate normal pressure range for your system)	High suction pressure will result in temperatures in the equipment the compressor is attached to. Maximum pressure is 150 psi.
		Desired Discharge pressure. 120 – 150 psig (Indicate normal pressure range for your system)	High discharge pressure may result in deadheading the compressor. Maximum 300 psi
		Desired 210 psig maximum discharge pressure switch setting for shutdown or unload	Over-pressurization may result in operation of pressure relief valves.
		Lubrication oil pressure: 40 - 60 psig	Loss of compressor lubrication may result in compressor seal damage and a release of ammonia.
		Lubrication oil temperature: 100°F-130°F	High lubrication oil temperature could result in compressor damage and a release of ammonia.
		Discharge temperature: 300°F	High discharge temperature could result in compressor damage and a release of ammonia.

Original Date:_____

Revision Date: STAV_07-000023

Ammonia Refrigeration Management Program
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Controls and Instrumentation			
Description	**Item Number**	**Function**	**Position/Set point**
Pressure indicator	On each compressor and/or on the operator interface terminal (M&Mpanel –computer screen)	Pressure indication on compressor discharge	120 - 150 psig. (Indicate normal pressure range for your system)
Pressure indicator	On each compressor and/or on the operator interface terminal (M&Mpanel –computer screen)	Pressure indication on compressor suction	20 - 25 psig. (Indicate normal pressure range for your system)

Original Date:_____

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Ammonia Refrigeration Management Program
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

UNIT	Val #	Description	Function
RC-3	V-1	Globe valve	Suction at compressor
RC-3	V-2	Angle valve	Suction at main
RC-3	V-3	Globe valve	Discharge at compressor
RC-3	V-4	Check valve	Discharge check valve
RC-3	V-5	Globe valve	Discharge
RC-3	V-6	Globe valve	Oil separator oil return
RC-3	V-7	Globe valve	Oil separator oil drain
RC-3	V-8	Purge valve	Oil separator purge
RC-3	V-9	Relief valve	Oil separator relief
RC-3	V-10	Relief valve	Compressor relief
RC-3	V-11	Purge valve	Oil return purge
RC-3	V-12	Oil return	Oil return
RC-3	V-13	Gauge valve	Gauge discharge
RC-3	V-14	Gauge valve	Gauge suction
RC-3	V-15	Gauge valve	Gauge oil

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Ammonia Refrigeration Management Program
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Safety Systems			
Pressure relief valve	Internal device	Relieve excess refrigerant vapor pressure to compressor crankcase	250 psig Factory Set device
Description	**Item Number**	**Function**	**Position/Set point**
Low suction pressure cutout, operator set point.	Each Compressor Controller and/or the PLC control system monitors the low suction pressure setting.	The low suction pressure set point allows for compressor shut down at the set point.	10 hg alarm – 15 hg failure Note: The above setpoints are suggested for icemaker systems operating with NH3 refrigerant. Other types of systems (i.e. cold storage or air conditioning) using refrigerant differing from NH3 will likely be set differently THESE SETPOINTS WILL BE PLANT AND SYSTEM SPECIFIC
High discharge pressure cutout, operator set point.	Each Compressor Controller and/or the PLC control system monitors the high discharge pressure setting.	Alert personnel and/or protect the compressor from damage due to high discharge pressure by alarming and/or then shutting down compressor	Alarm 205 PSIG Shutdown 210 PSIG Note: The above setpoints are suggested for icemaker systems operating with NH3 refrigerant. Other types of systems (i.e. cold storage or air conditioning) using refrigerant differing from NH3 will likely be set differently THESE SETPOINTS WILL BE PLANT AND SYSTEM SPECIFIC
Low lubrication oil pressure alarm and cutout	Each Compressor Controller monitors the low lubrication oil pressure cut out	Protect the compressor from damage due to low lubrication oil pressure by shutting down compressor	Alarm 35 psi diff Shutdown 30 psi diff 90 Second delay

Original Date:_____

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Standard Operating Procedure (SOP)

Task Flow

Manual start-up procedures

Monitor normal operations

Manual shut-down procedures

Emergency shut-down procedures

Task	Step	Comment
Manual start-up procedures (during normal operations following maintenance operations)	1.Visually check the compressor for lockout/tag-out devices.	IF ANY LOCKOUT/TAGOUT DEVICE IS FOUND THAT WAS NOT INSTALLED BY YOU, IT IS ABSOLUTELY IMPERITIVE THE PERSON WHO INSTALLED SUCH DEVICE BE CONSULTED WITH BEFORE PROCEEDING. During normal operations, the compressor will start, stop, automatically load, and unload based on suction pressure.
	2.Visually check the compressor crankcase oil level sight glass.	Oil should appear to be clean and the sightglass should indicate 1/2 full
	3.Check the crankcase oil temperature thermometer for proper starting temperature	Minimum starting temperature is 100°F If not at minimum temperature, check that the oil heater is on and wait until the oil temperature is at least at the minimum point before attempting to start the compressor.
	4.Check to ensure a sufficient quantity of condenser(s) is enabled to operate.	
	5.Manually open the compressor discharge service valve RC-1V-2 / RC2-V-2 / RC3-V-3 slowly to (full open)	
	6.Manually open the compressor suction service valve RC1-V-1 / RC2-V-1 / RC3-V-1 slowly to (full open)	
	7.Ensure that any manual valves on the oil cooler water supply and return line are open.	Remove any tags associated with valves, valve settings or disconnects on the compressor.
	8.Turn on or reset any disconnects that were turn in the off position.	

AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Task	Step	Comment
	9. Start the compressor using the start/stop button or switch located on the control or starter panel, or on the Panelview. Pay close attention to the sound, the appearance of the oil in the sightglass, the pressures of the oil, the suction and the discharge. Also close observance of the compressor head temperature should be made.	The compressor will start, oil pressure and discharge pressure will begin to increase as the suction pressure decreases
	10. If equipped, monitor analog data on the microprocessor to ensure that all the parameters are within the acceptable range.	Check M&M panel.
	11. Monitor the system for ammonia /oil leaks.	If any unusual conditions (ammonia or oil leaks, noises, or vibration) are observed. Stop compressor, make corrections and restart the compressor.
	12. Remove all lock out tags used to identify valves that were opened or closed during the shutdown or maintenance procedure.	
Monitor normal operations	1. Check compressor at least once every hour for normal operation. The compressor log sheet should be filled out once per shift.	Compressor is checked more frequently if it operates outside acceptable parameters.
The compressor log sheet should be filled out once per shift. The sheets will be collected by the Plant Engineer, reviewed, signed and filed daily. The logbook will remain on file in the Plant Engineers Office. Check lubrication schedule daily for any listed equipment due for lubrication.	1.Steps to Operate within Desired Ranges: Suction pressure: check the compressor to be operating within the desired parameters. Adjust the load accordingly Discharge pressure: check position of discharge valve and check operation of evaporative condenser. Lubrication oil pressure and temperature, discharge temperature: Check the position of oil valves, suction pressure, and compressor load.	Read and be familiar with the Mycom operating manual and procedures recommended by Mycom. There is wealth of valuable learning material included in the manuals

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Manual shutdown procedures (normal shutdown and shutdown for maintenance operations)	1. For a normal, short duration shutdown, go to the control or starter panel, or the M&M panel, and simply turn the compressor start/stop switch to the off position.	During normal operations, the compressor is automatically started and stopped, and will automatically load and unload based on suction pressure.
	2. For a long term or maintenance shutdown, good practice would be to decrease the load, close the suction service valve RC1-V-1 / RC2-V-1 / RC3-V-1, allow the compressor to pumpdown, go to the control station and turn the compressor start/stop switch to the off position	Follow steps 2 — 12 only if the shutdown is for compressor maintenance.
	3. Follow the lockout/tag-out procedures described in the lockout / tag-out manual and, if available, the specific lockout/tagout procedure that accompanies this SOP to lockout the appropriate disconnects and valves as necessary.	
	4. Close and tag the*isolation valve RC1-V-2 / RC2-V-2 / RC3-V-3 located in the compressor discharge line.	
	5. Close and tag the isolation valve RC1-V-5 / RC2-V-5 / RC3-V-6 located in the line that connects the oil separator to the oil float.	
	6. Close and tag the isolation valve RC1-V-9 / RC2-V-9 / RC3-V-14 located on the compressor, left of the suction service valve.	
	7. Carefully and slowly, loosen the union on the steel tube oil return line that is connected to valve RC1-V-5 / RC2-V-5 / RC3-V11 in order to bleed the ammonia vapor to atmosphere.	
	8.After the oil return line has completely purged, remove the line and adapter from valve RC1-V-2 / RC2-V-2 / RC3-V-3	

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STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

	9. Use appropriate adapters to connect a hose that is verified to be with in date and is the appropriate type for ammonia service to valve RC1-V-9 / RC2-V-9 / RC3-V-14 located on the compressor to the Jet Pump. (See SOP 10)	
	10. After the Jet Pump is connected and ready to operate, open valve RC1-V-9 / RC2-V-9 / RC3-V-14 and follow remaining procedure for Jet Pump operation.	
	11. Evacuate the residual ammonia from the compressor, until the pressure indicator located on the compressor reads 28 hg.	
	12. Remove jet pump and slowly open service valve RC1-V9 / RC2-V-9 / RC3-V-14 to atmosphere to verify there is no vapor remaining in compressor before starting work.	

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STANDARD OPERATING PROCEDURES — HIGH STAGE RECIPROCATING COMPRESSOR OPERATION

Emergency shutdown procedures	1. Shut off the compressor by shutting them down on the M&M panal or computer readout screen. If the button or switch cannot be reached, pull disconnects, throw breakers, or use any Emergency Stop button that is connected into the particular compressor starter circuit located outside the Mechanical room.	
	2. Follow the lockout/tag-out procedures described in the lockout / tag-out manual and, if available, the specific lockout/tagout procedure that accompanies this SOP to lockout the appropriate disconnects and valves as necessary.	Use these procedures if there are leaks on the compressor skid or if there is any mechanical damage to the compressor.
	3.Close and tag the isolation valve RC1-V-1 / RC2-V-1 / RC3-V-1 located in the compressor suction line	
	4. Close and tag the isolation valve RC1-V-2 / RC2-V-2 / RC3-V-2 located in the compressor discharge line.	
	5. Close and tag the isolation valves RC1-V-5 / RC2-V-5 / RC3-V-11 located in the line that connects the oil separator and the oil float.	

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Operation of Mycom Reciprocating Compressors Model

Objective	This procedure is established to describe the Technical Operating Specifications (TOS) and to set forth Standard Operating Procedures (SOP) for the operation of Mycom N6B (2)
Purpose	The purpose of the TOS is to provide a description of the compressor, define its function, operating conditions and limits, consequences of deviations from operating limits, describe its controls, instrumentation and safety systems and set its operating alignment(s). The purpose of the SOP is to establish the proper steps for startup, operation, and shut-down of the compressor.
Concerns	Careful attention to suction and discharge pressure, and lubrication oil temperature are important to this procedure because compressor damage can occur when compressors are dead-headed or when lubrication is lost. Among the incidents we are trying to prevent are: • Injury to operator(s) • Damage to compressors due to high discharge pressure or loss of lubrication • Over-pressurization of the refrigeration system (e.g., blocked in liquid) resulting in a release through pressure relief valves or failure or rupture of lines, tubes, or other equipment and a subsequent release
Department	**Facilities**
Operator/ Responsibility	**Facility Manager** — ~~Nick Buttera~~ Brian Carr **Plant Manager**
Equipment/Location	***(1)*** Mycom N6B (2) Located in the Mechanical Room in the south half of the building.
Related documents	Inspection and Maintenance Records — in the Plant Engineer's office. System Log Book — in the Plant Engineer's office. Manufacturer's Installation and Operations documents — in the Plant Engineers office. Block Diagrams — in the PSM/RMP Program document —Plant Engineers office. P&IDs - in the RMP Room / Quality Assurance Office.Program document— Facility Managers office / Mechanical Ammonia MSDS — Outside Facilities Office Copies of all documents — Facility Managers office.
Initial SOP development date	Brian Carr
Authorized by	~~Nick Buttera~~ / Gary Hardin
Revision	No. 0
Annual Review by	
Annual Review by	

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Technical Operating Specification (TOS)

Function The compressor is a pump to maintain desired suction pressure on a refrigeration system by removing ammonia vapor from the (refrigeration, icemaker) (circle one) (liquid recirculator, evaporator, icemaker, accumulator)(circle one). In the process, low-pressure ammonia vapor is compressed which creates heated high-pressure ammonia vapor. The high-pressure ammonia vapor is simultaneously pumped to the evaporative condensers where it is liquefied. The compressor oil is cooled via by a water-cooled, shell and tube heat exchanger mounted to the front side of the compressor. The oil is pumped from the compressor oil pump through the shell and water is pumped through the tubes. The water absorbs the heat from the oil, and is then routed through the cylinder heads and, having been supplied from the (condenser, fresh water line) (circle one) continues to the (sump tank) (circle one). The cool oil flows from the oil cooler into the seal housing, through the crankshaft to the rod and main bearings and returns to the crankcase sump. System suction pressure is maintained in the desired range by means of (pressure switches, and transducers) (circle one) acting upon unloaders and/or the compressor

Description	Capacity/Size	Operating Limits	Deviations/Consequences
Mycom (2) N6B	**"X"HP** (Replace "X" with motor horsepower rating as noted on the nameplate) "X"TR (Replace "X" with compressor rating at operating pressure conditions)	Desired Suction pressure: 0 psig – 3hg (Indicate normal pressure range for your system)	High suction pressure will result in temperatures in the equipment the compressor is attached to. Maximum pressure is 150 psi.
		Desired Discharge pressure. 20 - 25 psig (Indicate normal pressure range for your system)	High discharge pressure may result in deadheading the compressor. Maximum 300 psi
		Desired 210 psig maximum discharge pressure switch setting for shutdown or unload	Over-pressurization may result in operation of pressure relief valves.
		Lubrication oil pressure: 40 - 60 psig	Loss of compressor lubrication may result in compressor seal damage and a release of ammonia.
		Lubrication oil temperature: 100°F-130°F	High lubrication oil temperature could result in compressor damage and a release of ammonia.
		Discharge temperature: 300°F	High discharge temperature could result in compressor damage and a release of ammonia.

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Ammonia Refrigeration Management Program
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Controls and Instrumentation			
Description	**Item Number**	**Function**	**Position/Set point**
Pressure indicator	On each compressor and/or on the operator interface terminal (M&M mei —computer screen)	Pressure indication on compressor discharge	20 - 25 psig. (Indicate normal pressure range for your system)
Pressure indicator	On each compressor and/or on the operator interface terminal (M&Mpard —computer screen)	Pressure indication on compressor suction	3 hg - 0 psig. (Indicate normal pressure range for your system)

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Ammonia Refrigeration Management Program
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Safety Systems			
Pressure relief valve	Internal device	Relieve excess refrigerant vapor pressure to compressor crankcase	250 psig Factory Set device
Description	**Item Number**	**Function**	**Position/Set point**
Low suction pressure cutout, operator set point.	Each Compressor Controller and/or the PLC control system monitors the low suction pressure setting.	The low suction pressure set point allows for compressor shut down at the set point.	10 hg alarm – 15 hg failure
High discharge pressure cutout, operator set point.	Each Compressor Controller and/or the PLC control system monitors the high discharge pressure setting.	Alert personnel and/or protect the compressor from damage due to high discharge pressure by alarming and/or then shutting down compressor	Alarm 205 psig Shutdown 210 psig Note: The above setpoints are suggested for icemaker systems operating with NH3 refrigerant. Other types of systems (i.e. cold storage or air conditioning) using refrigerant differing from NH3 will likely be set differently THESE SETPOINTS WILL BE PLANT AND SYSTEM SPECIFIC
Low lubrication oil pressure alarm and cutout	Each Compressor Controller monitors the low lubrication oil pressure cut out	Protect the compressor from damage due to low lubrication oil pressure by shutting down compressor	Alarm 35 psi diff Shutdown 30 psi diff 90 Second delay

Original Date:_____

Revision Date:_____

Standard Operating Procedure (SOP)

Task Flow

Manual start-up procedures

Monitor normal operations

Manual shut-down procedures

Emergency shut-down procedures

Task	Step	Comment
Manual start-up procedures (during normal operations following maintenance operations)	1. Visually check the compressor for lockout/tag-out devices.	IF ANY LOCKOUT/TAGOUT DEVICE IS FOUND THAT WAS NOT INSTALLED BY YOU, IT IS ABSOLUTELY IMPERITIVE THE PERSON WHO INSTALLED SUCH DEVICE BE CONSULTED WITH BEFORE PROCEEDING. During normal operations, the compressor will start, stop, automatically load, and unload based on suction pressure.
	2. Visually check the compressor crankcase oil level sight glass.	Oil should appear to be clean and the sightglass should indicate 1/2 full
	3.Check the crankcase oil temperature thermometer for proper starting temperature	Minimum starting temperature is 100°F If not at minimum temperature, check that the oil heater is on and wait until the oil temperature is at least at the minimum point before attempting to start the compressor.
	4. Check to ensure a sufficient quantity of condenser(s) is enabled to operate.	
	5.Manually open the compressor discharge service valve RCB1-V2 / RCB2-V-2 slowly to (full open)	
	6.Manually open the compressor suction service valve RCB1-V-1 / RCB2-V-1 slowly to (full open)	
	7. Ensure that any manual valves on the oil cooler water supply and return line are open.	Remove any tags associated with valves, valve settings or disconnects on the compressor.
	8. Turn on or reset any disconnects that were turn in the off position.	

AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Task	Step	Comment
	9. Remove all valve tags used to identify valves that were opened or closed during the shutdown or maintenance procedure.	
	10. Start the compressor using the start/stop button or switch located on the control or starter panel, or on the Panelview. Pay close attention to the sound, the appearance of the oil in the sightglass, the pressures of the oil, the suction and the discharge. Also close observance of the compressor head temperature should be made.	The compressor will start, oil pressure and discharge pressure will begin to increase as the suction pressure decreases
	11. Monitor analog data on the microprocessor to ensure that all the parameters are within the acceptable range.	Check the M&M panel.
	12. Monitor the system for ammonia/oil leaks.	If any unusual conditions (ammonia or oil leaks, noises, or vibration) are observed. Stop compressor, make corrections and restart the compressor.
Monitor normal operations	1. Check compressor at least once every hour for normal operation. The compressor log sheet should be filled out once per shift.	Compressor is checked more frequently if it operates outside acceptable parameters.
The compressor log sheet should be filled out once per shift. The sheets will be collected by the Plant Engineer, reviewed, signed and filed daily. The logbook will remain on file in the Plant Engineers Office. Check lubrication schedule daily for any listed equipment due for lubrication.	2.Steps to Operate within Desired Ranges: Suction pressure: check the compressor to be operating within the desired parameters. Adjust the load accordingly Discharge pressure: check position of discharge valve and check operation of evaporative condenser. Lubrication oil pressure and temperature, discharge temperature: Check the position of oil valves, suction pressure, and compressor load.	Read and be familiar with the Mycom operating manual and procedures recommended by Mycom. There is wealth of valuable learning material included in the manuals

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Manual shutdown procedures (normal shutdown and shutdown for maintenance operations)	1. For a normal, short duration shutdown, go to the control or starter panel, or the Panelview, and simply turn the compressor start/stop switch to the off position.	During normal operations, the compressor is automatically started and stopped, and will automatically load and unload based on suction pressure.
	2. For a long term or maintenance shutdown, good practice would be to decrease the load, close the suction service valve RCB1-V-1/ RCB2-V-1, allow the compressor to pumpdown, go to the M&M panel and turn the compressor start/stop switch to the off position	Follow steps 2 — 12 only if the shutdown is for compressor maintenance.
	3. Follow the lockout/tag-out procedures described in the lockout / tag-out manual and, if available, the specific lockout/tagout procedure that accompanies this SOP to lockout the appropriate disconnects and valves as necessary.	
	4. Close and tag the*isolation valve RCB1-V-2 / RCB2-V-2 located in the compressor discharge line.	
	5. Close and tag the isolation valve RCB1-V-5 / RCB2-V-5 located in the line that connects the oil separator to the oil float.	
	6. Close and tag the isolation valve RCB1-V-9 / RCB2-V-9 located on the compressor, left of the suction service valve.	
	7. Carefully and slowly, loosen the union on the steel tube oil return line that is connected after RCB1-V-5 / RCB2-V-5 in order to bleed the ammonia vapor to atmosphere.	

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

	9. Use appropriate adapters to connect a hose that is verified to be with in date and is the appropriate type for ammonia service to valve RCB1-V-8 / RCB2-V-8 located on the compressor to the Jet Pump. (See SOP 10)	
	10. After the Jet Pump is connected and ready to operate, open valve RCB1-V-8 / RCB2-V-8 and follow remaining procedure for Jet Pump operation.	
	11. Evacuate the residual ammonia from the compressor, until the pressure indicator located on the compressor reads 28 hg.	
	12. Remove jet pump and slowly open service valve RCB1-V-8 / RCB2-V-8 to atmosphere to verify there is no vapor remaining in compressor before starting work.	

AMMONIA REFRIGERATION MANAGEMENT PROGRAM
STANDARD OPERATING PROCEDURES — LOW STAGE RECIPROCATING COMPRESSOR OPERATION

Emergency shutdown procedures	1. Shut off the compressors by shutting them down on the M&M panel or computer screen. If the button or switch cannot be reached, pull disconnects, throw breakers, or use any Emergency Stop button that is connected into the particular compressor starter circuit located outside of the Mechanical room.	
	2. Follow the lockout/tag-out procedures described in the lockout / tag-out manual and, if available, the specific lockout/tagout procedure that accompanies this SOP to lockout the appropriate disconnects and valves as necessary.	Use these procedures if there are leaks on the compressor skid or if there is any mechanical damage to the compressor.
	3.Close and tag the isolation valve RCB1-V-1/ RCB2-V-1 located in the compressor suction line	
	4. Close and tag the isolation valve RCB2-V-2/ RCB1-V-2 located in the compressor discharge line.	
	5. Close and tag the isolation valves RCB1-V-5 RCB2-V-5 located in the line that connects the oil separator and the oil float.	

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Line and Equipment Opening / Oil Draining Procedure

Objective	This procedure is established to describe the Safe Work Practice for safely opening lines and equipment for maintenance and turnaround.
Purpose	The purpose of this Safe Work Practice is to provide the procedures for safely opening lines and equipment in the ammonia refrigeration system. The steps in this procedure are to be followed when opening an ammonia line or connected equipment to inspect, remove, repair, clean, or reinstall the line or connected equipment. Examples of operations which could be considered line opening are: Removing a strainer basket Working on a transfer pump seal Removing a valve from a transfer line for repair Draining oil from an oil trap reservoir
Concerns	Whenever ammonia refrigeration lines and equipment are taken out of service, care must be taken to prevent accidental leakage of ammonia. To minimize potential leakage from lines and equipment that contain ammonia, they should be pumped out before being opened. It should be assumed that the line or equipment could contain liquid ammonia unless absolutely proven otherwise. Among the incidents we are trying to prevent are: Injury to operator(s) during the line and equipment opening procedure Potential fire and explosion due to attaining a flammable atmosphere and providing an ignition source
Department	Maintenance
Operator/ Responsibility	Facility Manager – Nick Buttera
Equipment / Location	One controlled pressure receivers located at southwest corner of facility behind evaporative condensers. Five reciprocating compressors, in the engine room on the west end of the facility. One low temp recirculator in the engine room. One high temperature recirculator in the engine room. One evaporative condenser outside on the roof above the engine room. Three evaporators in the storage freezer. Nine evaporators in the coolers.. Four evaporators on the dock. One Medium Temperature vessel located in the engine room.
Related documents	Inspection and Maintenance Records — in the Facility Managers' office. System Log Book — in the Facility Manager's office. Manufacturer's Installation and Operations documents — in the Facility Managers office. Block Diagrams — in the PSM/RMP Program document — Facility Managers office. P&IDs - in the RMP Program document — Facility Managers office. Ammonia MSDS — in Right to Know notebook located in the hall at battery charging station. Copies of all documents — Facility Managers office.
Initial SOP development date	
Authorized by	
Revision	No. 0
Annual Review by	

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STANDARD OPERATING PROCEDURES — LINE AND EQUIPMENT OPENING/OIL DRAINING PROCEDURE

Standard Operating Procedure (SOP)

Task Flow

Preparation

Assemble equipment

Line and equipment opening procedures

Oil trap draining procedures

Task	Step	Comment
Preparation	1. Be familiar with the emergency response procedures for the facility.	
	2. Know the location of the nearest eye wash/safety shower.	
	3. Know the location of the valves, which would be closed to isolate the line/equipment in an emergency.	
	4. Be familiar with ammonia first aid procedures.	
	5. Be familiar with the lockout / tag out procedures.	
Assemble equipment	6. Before going to the line and equipment opening procedures, assemble the following equipment: Elbow length rubber gloves Splash goggles and face shield Clean bucket containing water Valve wheel wrench for closing and opening valves Closed valve markers and locks Emergency service bucket containing a full face type gas mask, eye wash bottle, pipe wrench	Work smart and safe! Do not cut any corners. Use the correct tools, material, and parts.
Line and equipment opening procedures	1. Notify personnel and supervisors in the area that line and equipment opening procedures are to be carried out.	
	2. Ensure that a backup person (buddy-system) is available for the remainder of these procedures.	
	3. Close and tag the isolation valve(s) in the liquid supply line and in the hot gas line for the lines/equipment to be taken out of service.	Consult the P&IDs to verify which valves need to be closed to isolate the lines/equipment.
	4. If the lines/equipment to be isolated are located on the discharge side of a pump or compressor, lockout and tag the pump or compressor motor disconnect.	

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	5. When possible use system suction to evacuate the line/ equipment. If the line/equipment is not connected to a suction line, then using a hose properly approved, verified to be with in date and is for ammonia service work to the low suction side of the system, and evacuates the residual liquid ammonia.	
	6. After most of the frost has disappeared and the gauge reads zero psig, the liquid should be gone from the line/ equipment. Close the valve and then remove hose, then reopen the hand valve to the atmosphere to verify there is no vapor present. Leave the valve port open and install tag showing valve is open so no pressure can rebuild in line/equipment.	
	7. When you have proven there is no residual vapor present in the line/equipment by open the valve port to the atmosphere, the work or procedure may begin.	
	8. After maintenance or procedure is complete, slowly and carefully, allow gas only from the suction side or hot gas line to flow into the line/equipment so any leaks can be detected prior to introducing any liquid ammonia back into the line/equipment. Remove all safety tags place all valves back into the open position and follow any associated SOP startup procedure that may be involved.	

Oil trap draining procedures	1. As the ammonia is compressed and the gas flows out to the system there will be a certain amount of compressor lubrication oil transferred into the refrigeration system piping. The oil draining procedure is necessary to maintain system efficiency and integrity. By system design there are oil collection points at which oil can be retrieved. This procedure provides a guideline to ensure that draining oil from pot is done safely, with minimal ammonia release to the atmosphere.	This is a common occurrence in a mechanical refrigeration system and this procedure, while done on a periodic basis, still needs to be handled with great caution, as the system will be under pressure. **As always, treat ammonia with respect.**
	2. There are numerous locations where oil potwill need to be drained on a regular basis. Most of these locations will be found on the "low pressure" side of our system. This means that there should only be approximately 30 pounds of ammonia pressure pushing the oil out of the system. Pay close attention to the frost or the lack of frost on the oil collection pot. When there is no frost present, this indicates the pot is full of oil and requires draining. Note that when the pot is empty the pot will be completely covered with frost and does not require draining.	Verify that your system oil drain pots have safety relief valve protection installed. **Never isolate oil pots that are not equipped with a safety relief valve.**

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	3. At each location where oil is to be drained, there will be a small diameter pipe (typically 1/2") that is pointed downward with a hand valve immediately before it. The pipe is pointed downward so that oil may be collected by means of a bucket.	A safety spring type closing drain valve is, by far, much safer than a hand valve that must be turned to open and or to close.
	4. If there is a cap or plug after the hand isolation valve, remove the safety plug or cap slowly from the end of the small diameter drainpipe. Residual ammonia could be present if the isolation valve were to leak, (This plug is in place to prevent an accidental release of ammonia)	For steps 4 through 10, always be in a position on the updraft side of the oil drain bucket and wear gloves, and a full-face respirator.
	5. Position a bucket under the drainpipe to catch the oil you are about to drain. This bucket should be able to sit firmly on the floor or ground, as the majority of our drain points are located at floor level.	
	6. If the spring type self-closing valve is not installed or is damaged one should be acquired and installed immediately. In most cases you will get a lot of foam, continuously allow foam to settle.	**DO NOT, FOR ANY REASON, TAMPER WITH VALVE SAFETY CLOSING SPRING FEATURE OR FORCE VALVE INTO THE OPEN POSITION WHILE DRAINING OIL!**
	7. Allow the oil to continue draining slowly. As the oil drains and the pot empties you will notice there will be some short bursts of "foamy" oil that appears to have some gas or liquid mixed with it. This indicates that the majority of the oil has been drained and the valve can be closed.	
	8. Close the valve and re-insert the safety plug.	
	9. Carry the bucket of oil to the used oil container, located under the condensers, in the parking lot at the southwest corner of the building.	
	10. Carefully pour the oil into the used oil container.	

 Original Date:_____

Revision Date:_____

Stavis Seafoods, Inc.

212 Northern Avenue, Suite 305
"Fish Pier West" Boston, MA 02210
Phone: 617-482-6349 Fax: 617-482-1340
www.stavis.com

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

PREVENTIVE MAINTENANCE PROGRAM

Stavis Seafood
Daily PM Checklist

Date

Compressors

Inspect pulleys and belts	
Check oil level in crankcase	
Flush water from oil cooler to remove any sediment	
Check for ammonia leak	
Check water circulation and ensure heads are cool	
Check for excessive vibration	

Condenser

Check for ammonia leaks	
Inspect belts and pulleys, and tighten if necessary	
Check for proper head pressure	
Inspect condenser and verify water is circulating	
Check for excessive vibration	

Evaporators

Inspect fan motors for proper operation	
Check frost pattern on coils	
Check for ammonia leaks	

Icemakers

Check for ammonia leaks	
Check for normal operation	

Comments

Safety Verification / Transducer Calibration

Compressor

AMERICAN REFRIGERATION COMPANY, INC.
109 River Street, Suite 3 • Andover, MA 01810
Tel: 978•474•4000 Fax: 978•474•4001 Toll Free: 800•795•1120

Customer Name	STAVIS SEAFOOD
Customer Address	

Test Date	2/6/15
Tested By	Chris Milward
Service WO #	

Equipment Details

Compressor Identification	Serial Number	Run Hours	Control Panel Type
Mycom HS#3	832756	4,069	Press

Set Points

	Safeties			Transducer Calibration	
	Set Point	Alarm Point	Fail Point	Initial	Calibrated
Suction Pressure	28#	10#	10#	✓	—
Suction Temperature	—	—	—	—	—
Discharge Pressure	120#	200#	200#	✓	—
Discharge Temperature	—	—	—	—	—
Oil Pressure (Low Start)	75#	20#	20#	✓	—
Oil Pressure (High Start)	75#	20#	20#		
Oil Pressure (Low Run)	75#	20#	20#		
Oil Pressure (High Run)	75#	20#	20#		
Oil Temperature (Low)	—	—	—	—	—
Oil Temperature (High)	—	—	—		
Oil Filter Pressure	—	—	—	—	—
Oil Filter Pressure (Drop/Diff)	—	—	—	—	—
Separator Temperature (Low)	—	—	—	—	—
Separator Temperature (High)	—	—	—		
Motor Amperage (High)	170	225	225	✓	—
High Level Float(s) (Circle)	OK		BOTH VESS		

Status Comments

Safety Verification / Transducer Calibration

Compressor

AMERICAN REFRIGERATION COMPANY, INC.
149 Pl[illegible] Street, Suite 3 • Andover, MA 01810
Tel: 978•474•4003 Fax: 978•474•4001 Toll Free: 888•200•1178

Customer Name	STAVIS SEAFOOD
Customer Address	

Test Date	2/6/15
Tested By	Chris Milward
Service WO #	

Equipment Details

Compressor Identification	Serial Number	Run Hours	Control Panel Type
Mycom B#2	17454	10,129	Press

Set Points

	Safeties			Transducer Calibration	
	Set Point	Alarm Point	Fail Point	Initial	Calibrated
Suction Pressure	1#	10"	10"	✓	—
Suction Temperature	—	—	—	—	—
Discharge Pressure	28~~0~~#	90#	90#	✓	—
Discharge Temperature	—	—	—	—	—
Oil Pressure (Low Start)	—	12#	12#	✓	—
Oil Pressure (High Start)	—54#	12#	12#		
Oil Pressure (Low Run)	—	12#	12#		
Oil Pressure (High Run)	—	12#	12#		
Oil Temperature (Low)	—	—	—	—	—
Oil Temperature (High)	—	—	—		
Oil Filter Pressure	—	—	—	—	—
Oil Filter Pressure (Drop/Diff)	—	—	—	—	—
Separator Temperature (Low)	—	—	—	—	—
Separator Temperature (High)	—	—	—		
Motor Amperage (High)	50		100	—	—
High Level Float(s) (Circle)	OK		BOTH VESS		

Status Comments

Safety Verification / Transducer Calibration

Compressor

AMERICAN REFRIGERATION COMPANY, INC.
149 River Street, Suite 3 • Andover, MA 01810
Tel: 978•474•4003 Fax: 978•475•4001 Toll Free: 888•338•1120

Customer Name	STAVIS SEAFOOD
Customer Address	

Test Date	2/6/15
Tested By	Chris Milward
Service WO #	

Equipment Details

Compressor Identification	Serial Number	Run Hours	Control Panel Type
Mycom B#1	17455	9050	Press

Set Points

	Safeties			Transducer Calibration	
	Set Point	Alarm Point	Fail Point	Initial	Calibrated
Suction Pressure	2#	10#	10#	✓	—
Suction Temperature	—	—	—	—	—
Discharge Pressure	28#	90#	90#	✓	—
L harge Temperature	—	—	—	—	—
Oil Pressure (Low Start)	54#	10#	10#	✓	—
Oil Pressure (High Start)	54#	10#	10#		
Oil Pressure (Low Run)	54#	10#	10#		
Oil Pressure (High Run)	54#	10#	10#		
Oil Temperature (Low)	—	—	—	—	—
Oil Temperature (High)	—	—	—		
Oil Filter Pressure	—	—	—	—	—
Oil Filter Pressure (Drop/Diff)	—	—	—	—	—
Separator Temperature (Low)	—	—	—	—	—
Separator Temperature (High)	—	—	—		
Motor Amperage (High)	50	—	100	✓	—
High Level Float(s) (Circle)	OK		BOTH YESS		

Status Comments

Safety Verification / Transducer Calibration

Compressor

AMERICAN REFRIGERATION COMPANY, INC.
149 Elliot Street, Suite 3 · Andover, MA 01810
Tel: 978·474·4000 Fax: 978·474·4001 Toll Free: 800·383·1126

Customer Name	STAVIS SEAFOOD
Customer Address	

Test Date	2/6/15
Tested By	Chris Milward
Service WO #	

Equipment Details

Compressor Identification	Serial Number	Run Hours	Control Panel Type
Mycom HS#2	MB-4126	3,071	press

Set Points

	Safeties			Transducer Calibration	
	Set Point	Alarm Point	Fail Point	Initial	Calibrated
Suction Pressure	28#	10#	10#	✓	—
Suction Temperature	—	—	—	—	—
Discharge Pressure	120#	195#	195#	✓	—
Discharge Temperature	—	—	—	—	—
Oil Pressure (Low Start)	68#	10#	10#	✓	OK
Oil Pressure (High Start)	68#	10#	10#		
Oil Pressure (Low Run)	68#	10#	10#		
Oil Pressure (High Run)	68#	10#	10#		
Oil Temperature (Low)	—	—	—	—	—
Oil Temperature (High)	—	—	—		
Oil Filter Pressure	—	—	—	—	—
Oil Filter Pressure (Drop/Diff)	—	—	—	—	—
Separator Temperature (Low)	—	—	—	—	—
Separator Temperature (High)	—	—	—		
Motor Amperage (High)	96	150	150	—	—
High Level Float(s) (Circle)	(OK)		BOTH YES		

Status Comments

Stavis Seafoods, Inc.

212 Northern Avenue, Suite 305
"Fish Pier West" Boston, MA 02210
Phone: 617-482-6349 Fax: 617-482-1340
www.stavis.com

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

CONTRACTOR PROGRAM

STAVIS SEAFOODS, INC,
7 CHANNEL STREET
BOSTON, MA 02210

Contractors Covered by the Contractor Program

The following contractors are covered by the contractor program and have been sent copies of the contractor evaluation form:

1. _____

2. _____

STAVIS SEAFOODS, INC.
7 CHANNEL STREET
BOSTON, MA 02210

Contractor Evaluation Form

1. List the percentage of your business on ammonia refrigeration in the last 2 years: _____%

2. Provide us with the names and telephone numbers of at least three references for related ammonia refrigeration projects completed in the past 5 years.

3. Are your employees trained on the potential hazards associated with ammonia and on general ammonia refrigeration principals?
   _____ Yes _____ No

4. Do you have a safety and health training program that meets Occupational Safety and Health Administration (OSHA) requirements (29 CFR 1926.21(b)
   _____ Yes _____ No

5. Provide us with certificates of insurance for each of the following (as applicable):
   a. Workers Compensation and Employers' Liability
   b. Commercial General Liability
   c. Automobile Liability
   d. Pollution Liability

6. Provide us with your OSHA Recordable Injury Rate and/or your Experience Modification Rating (EMR):
   _____ OSHA Recordable Injury Rate
   ____ Experience Modification Rating (EMR)

7. Have you experienced hospitalization of three or more employees or any construction fatalities within the past 3 years? If yes, attach a full discussion of causes and results.
   _____ Yes _____ No

8. Have you received any OSHA citations within the past 3 years? If yes, attach a full discussion of events and results.
   _____ Yes _____ No

9. Provide documentation that your employees are certified welders (if applicable).

I _____, representing _____
by signing below certify that to the best of my knowledge the above information is correct and up to date.

Signature: _____ Date: _____

STAVIS SEAFOODS CONTRACTOR GMP TRAINING PROGRAM

This program has been created and implemented to instruct and train outside contract personnel in the policies and procedures of Stavis Seafoods Good Manufacturing Practices (GMP,$) when working in and around facility processing, packaging, and storage areas.

1) **All outside contractors are required to sign visitor log book in the cash sales office upon arrival at facility.**
2) **All outside contractors will wear a visitors badge when working in the facility.**
3) **Hairnets are required when working in processing areas.**
4) **Food and drink are permitted in break room only**
5) **Smoking is permitted in designated smoking area only.**
6) **Pest management professional (PMP) will use only approved chemicals and devices for pest control purposes.**
7) **In the event of an emergency, facility evacuation, all contractors are asked to remain on site and evacuate to the predetermined meeting place, the north side of the building by the property fenceline.**
8) **Whenever a contractor is working in the facility and servicing a machine that would require a lockout/tagout, the contractor will follow their company's lockout/tagout program.**
9) **If an injury to a contractor occurs on Stavis Seafoods company property, they will immediately notify their company contact or the closest supervisor.**

Name _____ **Date**_____

STAVIS SEAFOODS CONTRACTOR GMP TRAINING PROGRAM

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9) **If an injury to a contractor occurs on Stavis Seafoods company property, they will immediately notify their company contact or the closest supervisor.**

Name _____ **Date** 8/15/14

Stavis Seafoods, Inc.

212 Northern Avenue, Suite 305
"Fish Pier West" Boston, MA 02210
Phone: 617-482-6349 Fax: 617-482-1340
www.stavis.com

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

TRAINING

Certificate of Completion

This certifies that

John Murphy

has completed an 8 hour refresher course and demonstrated competency in the handling & emergency response to *ANHYDROUS AMMONIA* in accordance with the Standards set by Tanner Industries, Inc. and complied with OSHA 29 CFR 1910.120(q), Technician Level.

Certificate # MA 032214-11

March 22, 2014
DATE

Frank Bramble, Instructor
Tanner Industries, Inc., Southampton, PA

STAV_07-000057

Garden City Ammonia Program

All ammonia refrigeration systems must have qualified personnel with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

Industrial Refrigeration Operator II

This certifies that the person listed below has completed all the necessary requirements for this level of training and is equivalent to 40 hours of refrigeration technical training or 3.6 CEU's

BRIAN CARON

Instructor: Tyler Ramos (620) 271-0037

Tyler Ramos

Date July 30-Aug. 2, 2012

Safety Manager:

Plant Engineer:

www.AmmoniaTraining.com

All records are kept on file at Garden City Ammonia Program, P.O. Box 2336, Garden City, Kansas 67846
"Recognized as one of the nations top training programs in Industrial Ammonia Refrigeration "

5437.12

STAV_07-000058

Garden City Ammonia Program

All ammonia refrigeration systems must have qualified personnel with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

Industrial Refrigeration Operator I

This certifies that the person listed below has completed all the necessary requirements for this level of training and is equivalent to 40 hours of refrigeration technical training or 3.6 CEU's

BRIAN CARON

Instructor: Randy Williams (620) 271-0037

Randy Williams

Safety Manager:

E Poirier

Date August 15-18, 2011

Instructor:

Plant Engineer:

www.AmmoniaTraining.com

All records are kept on file at Garden City Ammonia Program, P.O. Box 2336, Garden City, Kansas 67846
"Recognized as one of the nations top training programs in Industrial Ammonia Refrigeration "

4487.11

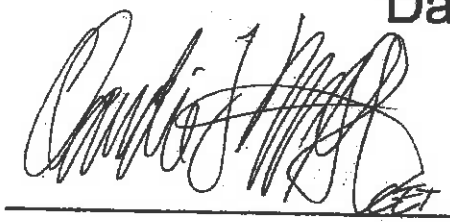
STAV_07-000059

Certificate of Attendance

This is to certify that

Brian Caron

has successfully completed 24 hours
of training for Hazardous Materials Technicians
29 CFR 1910.120(q)(6)(iii) with focus on Ammonia
October 20, 21 and 22, 2010
Highliner Foods (USA) Incorporated
Danvers, Massachusetts



Claudie L.M. Grout, CET
ENVISION *Exceptional Instruction*
603-659-0068

STAV_07-000060

Certificate of Completion

This certifies that

Brian Caron

has completed an 8 hour refresher course and demonstrated competency in the handling & emergency response to

ANHYDROUS AMMONIA

in accordance with the Standards set by
Tanner Industries, Inc.
and complied with OSHA 29 CFR 1910.120(q), Technician Level.

Certificate # MA 032214-25

March 22, 2014
DATE

Frank Bramble, Instructor
Tanner Industries, Inc., Southampton, PA

STAV_07-000061

STAVIS SEAFOODS, INC.

Training Log

Name of Trainer: Date of Training:

Name Of Person Receiving Training	Title	Signature
Jim McPartlin	Asst OPPS	Jim McPartlin

Topics Covered During Training	
10-15-15	Ammonia Safety training

Stavis Seafoods, Inc.

212 Northern Avenue, Suite 305
"Fish Pier West" Boston, MA 02210
Phone: 617-482-6349 Fax: 617-482-1340
www.stavis.com

AMMONIA REFRIGERATION MANAGEMENT PROGRAM

EMERGENCY RESPONSE

APPENDIX A

EMERGENCY RESPONSE PLAN FOR AMMONIA RELEASE

1.0 EMERGENCY RESPONSE PLAN: This emergency response plan has been developed for the Stavis Seafood Company under SARA and OSHA requirements.

1.1 PRE-EMERGENCY PLANNING AND COORDINATION WITH OUTSIDE PARTIES

1.1.1 Scope: Relative to 29 CFR 1910.120(q) (2) (i)-(xi) , this emergency response plan has been developed to cover only uncontrolled releases of anhydrous ammonia refrigerant. Our HAZMAT team is not authorized, trained, or equipped to handle any other hazmat situations. In such cases, the entire plant including the Refrigeration HAZMAT Team will evacuate under section 3 of this plan, and the Boston Fire Department's HAZMAT UNIT will respond to the hazmat call.

1.1.2 Site and Facility Description:

a. Location: A 35,000 sq ft industrial site located at 7 Channel Street in the Boston MA.
b. Hazards: Anhydrous Ammonia
c. Occupancy: Industrial, a seafood processing plant and storage
d. Environmental: Boston harbor.
e. Area Affected: The refrigeration unit located along the southern side of the building.
f. Surrounding Industrial Park
g. Topography: Flat terrain
h. Weather: Precipitation will produce aqueous ammonia; wind direction must be noted. There is a wind sock over the main plant

1.1.3 Interaction with the SERC and LEPC Plans:

a. This plan is compatible with the Commonwealth of Massachusetts, County of Suffolk, and Boston emergency response plans.
b. All chemicals covered in the plant hazard communication (right-to-know) program have been reported to the Massachusetts Department of Environmental Resources to fulfill SARA Title III requirements.

1.1.4 Coordination with outside Parties:

a. Federal Agencies:
(1) Any work-related employee fatalities or catastrophes must be reported to the local OSHA office within 48 hours of their occurrence:
U.S. Department of Labor -OSHA
JFK Federal Building, Room E340
Boston, Massachusetts 02203
(617) 565-9860
(617) 565-9827 FAX

(2) Any release of anhydrous ammonia or other hazardous chemical into the outside

air or any sewer, waterway, or groundwater must be reported immediately to the EPA:

U.S. Environmental Protection Agency Hazardous Waste Branch
5 Post Office Square - Suite 100
Boston, MA 02109-3912
1-888-372-7341

b. State Agencies:
(1) Any release of anhydrous ammonia or other hazardous chemical into the outside air or any sewer, waterway, or groundwater must be reported immediately to the Massachusetts Department of Environmental Protection.
1 Winter Street
Boston Ma 02108
617-292-5500

c. City/County Agencies:
(1) Boston Emergency Management Agency.
1 City Hall Square, Room 204
Boston, MA 02201-2015
Telephone: 617.635.1400
e. Contractors:
(1) American Refrigeration Service, Inc.
149 River Street
Andover, MA 01810
Toll Free: 888-388-1120
Local: 978-474-4000
Fax: 978-474-4001

1.2 PERSONNEL ROLES, LINES OF AUTHORITY, TRAINING AND COMMUNICATION

1.2.1 Onsite Organization, Lines of Authority and Coordination:
The following job titles are designated to carry out the stated job functions on site. If one of the following job titles is unavailable, then he or she must designate another person or job title to carry out those assigned functions before he or she becomes unavailable or not represented on the plant emergency response team. In the event of an uncontrolled release of anhydrous ammonia from the plant's primary and/or secondary refrigeration systems, the operations manager will initiate the incident command system (ICS) and insure an orderly evacuation of plant. Before reentry, the operations manager
shall insure that it is safe to do so.

a. VP OF OPERATIONS / OPERATIONS MANAGER: Responsible for all compliance requirements whether taken on, delegated, or disregarded.

b. **INCIDENT COMMANDER:** This is the highest ranking individual on site at time of incident. He is exclusively responsible for managing the incident to a successful conclusion, supervising the response team.

c. **INCIDENT SAFETY OFFICER:** He serves in the staff function of site safety and health officer. He advises the operations manager and incident commander on all areas of employee and public safety and health.

d. **INCIDENT INFORMATION OFFICER:** He directs communication to the press and employees.. He serves in a staff function under the operations manager to assist the incident commander as necessary. He also serves as the incident record keeper logging all arrivals and departures at the site.

e. **INCIDENT SCRIBE:** Records all activities and maintains logs of the incident. To be designated by Incident Commander at time of incident.

f. **INCIDENT RESPONSE TEAM:** This is the shift refrigeration supervisor and /or his designee. He is responsible for managing the HAZMAT OPERATION. He reports directly to the operations manager and incident commander.

g. **FINANCIAL OFFICER:** Keeps record of all costs related to incident.

h. **INCIDENT TEAM MEMBERS:** These are members of the American Refrigeration Company technical and operational staff. Stavis refrigeration employees work in conjunction with American refrigeration.
In the case of an anhydrous ammonia leak or spill, the emergency response team will perform the following:
(1) Sound the gas alarm; notify the plant manager and plant security.
(2) Affect the immediate shutdown of the plant primary and/or secondary refrigeration systems.
(3) Find the source{s) of the leak.
(4) Repair faulty equipment.
(5) Retest for leaks.
(6) Restart the refrigeration system.

1.2.2 Training:
a. The following training categories and subject areas will be given to the following employees:

(1) **Level 1- First Responder (Awareness) Level:**
All plant employees will be trained at this level.Annual refresher training will cover a review of this plan and any
hazards specific to each employee's duties. Written documentation of initial and annual training will be maintained by the plant personnel director for each plant employee. In these records, the plant safety director will certify the initial and annual training for each employee. All first responder training will be provided in house under the direction of the plant safety director. All plant employees must successfully complete this training; it may not be grand fathered or waived.

The content of the first responder (awareness) level training will include all of the following:
* Hazard communication training to meet or exceed the requirements of OSHA's Chemical Hazard Communication Standard, 29 CFR 1910.1200.
* Training in the purpose, content, and implementation of this emergency response plan.
* Ability to recognize abnormal and/or hazardous conditions that need to be reported to one's supervisor or others in authority.
* Under 29 CFR 1910.120(q) (6) (i) the following competencies must be demonstrated upon completion of this training:
(a) An understanding of what hazardous substances are, and the risks associated with them in an incident.
(b) An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
(c) The ability to recognize the presence of hazardous substances in an emergency.
(d) The ability to identify hazardous substances, if possible.
(e) An understanding of the role of the first awareness individual in the company's emergency response plan including the site security and control and the use of the U. S. Department of Transportation's **Emergency Response Guidebook.**
(f) The ability to realize the need for additional resources, and to make appropriate notifications to the communications center.
Each employee must pass a test that demonstrates mastery of these areas before the Plant Safety Manager certifies his or her competence.

2. **Level 2 - First Responder (Operations) Level:**
No plant personnel will be trained at this level.
The requirements for this level can be found in 29 CFR 1910.120(q) (6) *(ii)* .

3. **Level 3 - HAZMAT Technician:**
Currently there are three employee's trained at this level.
The requirements for this level can be found in 29 CFR 1910.120(q) (6) *(iii)* .

4. **Level 4 – HAZMAT Specialist:**
All employees in the refrigeration company personnel will be trained at this level. Initial training will be at least 24 hours in duration. Annual refresher training will be 8 hour long.
The content of the HAZMAT specialist training will include all of the following:
* A thorough understanding of all chemical, physical, and biological hazards present or anticipated at the plant.
* The understanding and ability to perform specialized containment operations.
* The theory, use, and limitations of personal protective equipment (ppe) .
* An understanding of and the ability to use decontamination procedures.
* Intrinsic safety, confined space and ventilation procedures.
* An operational understanding of the incident command system (ICS) .
* An operational understanding of system safety and process leak abatement

*** A firm understanding that their HAZMAT specialist training is strictly limited to anhydrous ammonia leaks or spills and malfunctions in the plant refrigeration system.**

* Under 29 CFR 1910.120(q) (6) (iv) the following competencies must be demonstrated upon completion of training:

(a) Know how to implement the local emergency response plan.

(b) Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment.

(c) Know the state emergency plan.

(d) Be able to select and use proper specialized equipment provided to the hazardous materials specialist.

(e) Understand in-depth hazard and risk techniques.

(f) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.

(g) Be able to determine and implement decontamination procedures.

(h) Have the ability to develop a site safety and control plan.

(i) Understand chemical, radiological, and technological terminology and behavior.

Each HAZMAT Specialist must pass a test that demonstrates mastery of these areas before the Plant Safety Director certifies his or her competence.

5. **Level 5 - HAZMAT Incident commander:**

The Vice President, operations manager, plant engineer, and all refrigeration company responders will be trained at this level. The initial training will be at least 24 hours in duration. Annual refresher training will be 8 hours in duration. Anyone who meets level 5 training requirements t h r o ugh grand fathering or previous work experience, must still receive site-specific training relative to this plan. Written documentation of initial and annual training will be maintained by the plant personnel director.

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1.3 EMERGENCY RECOGNITION AND PREVENTION

1.3.1 Hazard Evaluation:

a. The anhydrous ammonia used in the plant's mechanical refrigeration system is the only chemical used in the plant whose leak, spill, or uncontrolled release would trigger a HAZMAT emergency response action.

b. The concentrations and hazards of anhydrous ammonia exposure are presented in section xx

c. Normally anhydrous ammonia is not a fire or explosion hazard. If, however, this gas does ignite, do not attempt to put the fire out unless you can stop the leak or flow of gas. Between the LEL and VEL anhydrous ammonia gas can ignite or explode, particularly in the confines of a room or small space with inadequate ventilation. Our plant's refrigeration department has been designed with intrinsically safe electrical equipment and an automatic ventilation system to maintain any escaping anhydrous ammonia concentration in the refrigeration rooms below the

LEL. In the unlikely event of ventilation failure (e.g. loss of commercial and auxiliary electrical power) or inadequate ventilation, the LEL may be exceeded. A warning alarm will automatically sound in the event of a ventilation system failure. This alarm has backup battery power. However for good safety practice, a combustible gas meter must be used in all anhydrous ammonia incidents.

d. A copy of the plant's written hazard communication program is maintained and available for reference in the safety office. Copies of all MSDS's are also maintained in the safety office. A copy of the MSDS for anhydrous ammonia is Appendix C to this emergency response plan.

1.3.2 Emergency Response: Any uncontrolled release of anhydrous ammonia gas or liquid will activate the plant's gas alarm and trigger a HAZMAT emergency response. Upon sounding the gas alarm, all plant employees will evacuate following the emergency action plan found in section 3 of this plan.
Only the HAZMAT team will reenter to stop the leak, ventilate the area affected, and repair the refrigeration system if possible.
An **uncontrolled release** of anhydrous ammonia is one that either sets off the automatic gas alarm or results from a maintenance function that cannot be handled safely by employees in the immediate work area.
A controlled or incidental release of anhydrous ammonia is one that results in a small spill or leak which can be handled safely by employees in the immediate area. If the release is sufficient to trigger the gas alarm or necessitate organized assistance from outside the immediate work area, then it is not a controlled or incidental release.
4.3.3 Hazardous Materials Incidents: Under this plan there are no hazardous materials incidents outside the scope of a HAZMAT emergency response to an anhydrous ammonia leak, spill, or mishap.

1.4 SAFE DISTANCES AND PLACES OF REFUGE

4.4.1 Site Map: Appendix A-1 presents the facility map. This figure indicates the direction north, the
location of all buildings, structures, equipment, emergency apparatus, first aid stations, routes of entry and exit, staging areas, and traffic control.
a. In an incident the incident commander must determine the prevailing wind direction, evaluate the situation, and overlay **Appendix A-1** with the following as necessary:
(1) Location of key personnel
(2) Location of key apparatus
(3) Location of the command post
(4) Location of the staging area
(5) Location of additional evacuation staging areas
(6) Location of the medical support area
(7) Location of transportation routes
(8) Locations of the Exclusion Zone, Contamination Reduction Zone and Support Zone
4.4.2 Places of Refuge : Section 1.4 of this plan and Appendix B list all places of refuge.

1.5 SITE SECURITY AND CONTROL

1.5.1 The plant security manager or the senior manager on duty will coordinate access, control, and security at the plant in an HAZMAT emergency response incident or scenario.
1.5.2 The Exclusion Zone will encompass the entire refrigeration department.
The contamination Reduction Zone will encompass the main plant building except for the refrigeration department.
The Support Zone will encompass all the rest of the site.

1.5.3 The driveway between Channel St and Harbor St at the main entrance to the plant will be the command post unless another location is chosen.
The staging areas will be Channel St by the fence line for the trailer storage area in front of the main plant building and the parking lot at the parking lot between Channel St and Drydock Ave,

1.6 EVACUATION ROUTES AND PROCEDURES

1.6.1 Emergency Procedures for General Facility Employees: Section 3 of this plan, the emergency action plan, covers these procedures.

1.6.2 Emergency Procedures for HAZMAT Emergency Responders: The following guidance in conjunction with section 3 of this plan will constitute the standard emergency procedures for all HAZMAT emergency responders.

a. Fires/non HAZMAT Emergencies: All HAZMAT team members will evacuate under Section 3 guidelines. Team members will **not** participate in any non anhydrous ammonia incidents.
d. Alternate Evacuation Routes: Alternate evacuation routes need to be designated for those situations where egress from the contaminated or involved area cannot occur safely.

1.6.3 Reentry: In all situations, where an outside emergency results in evacuation of the exclusion zone, personnel shall not reenter until:
a. The condition resulting in the emergency has been corrected.
b. The hazards have been reassessed and are manageable.
c. The site safety plan has been reviewed and revised if necessary.
d. HAZMAT personnel have been fully briefed on any changes.

1.7 DECONTAMINATION

1.7.1 Procedures: Decontamination for anhydrous ammonia is not required under normal conditions. Normal conditions prevail when the anhydrous ammonia is in the gas phase. In the liquid phase, anhydrous ammonia is extremely hazardous to the unprotected eye and skin.

1.7.2 Emergency Procedures: In the event of a ppe failure, retire to the contamination reduction zone as soon as possible. For eye contact, use the eye wash station; for skin contact use the deluge shower after doffing the level B protection.

1.7.3. Required Equipment: A whole body deluge shower and continuous dual stream eye wash station are necessary for emergency decontamination only.

1.8 EMERGENCY MEDICAL TREATMENT AND FIRST AID

1.8.1 Emergency Medical Care:
When the 911 call is initiated to the Boston Fire Department, a critical care ambulance and fire department paramedics will be dispatched to back up plant personnel and provide emergency transportation to Boston Area Hospitals.The following onsite first aid equipment is available in the refrigeration department:
First Aid Kit
Emergency Eye Wash station
Emergency Shower

Anhydrous ammonia is an acute inhalation, skin, and eye hazard.

a. Inhalation: Remove the affected person from the source of exposure. If not breathing, ensure open airway and institute cardiopulmonary resuscitation (CPR). If breathing if difficult, administer oxygen. Keep affected person warm and at rest. Get immediate medical attention.

b. Eye Contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention as soon as possible.

c. Skin Contact: Wash area of contact thoroughly with soap and water. Remove contaminated clothing immediately. Launder clothing before reuse. Get medical attention if irritation persists. Contact with liquefied gas may cause frostbite. Get immediate medical attention.

1.8.2 List of Emergency Telephone Numbers:
Police: 911
Fire: 911
Ambulance: 911

1.8.3 Emergency Medical Procedures:
a. Personnel Injured in contaminated Areas: HAZMAT team members will remove the injured person to one of the first aid stations outside the refrigeration department entry ways. The team leader and plant safety director shall evaluate the nature of the injury. The onsite manager shall initiate the appropriate first aid, and remove the injured person to the awaiting ambulance, if necessary.

b. Personnel Injured in Other Areas: Upon notification of an injury in the support or containment reduction zones, the team leader and plant safety director will assess the nature of the injury. The onsite manager will initiate the appropriate first aid and necessary follow-up procedures. The injured will be transported by fire department ambulance to Boston Area Hospital, if necessary.

1.9 EMERGENCY ALERTING AND RESPONSE PROCEDURES

Releases of anhydrous ammonia will be signaled by the sounding of the plant gas alarm. See section 2.1.4. Communications and emergency reporting particulars are discussed in section 4.2.3 and 3.1 respectively.

1.10 CRITIQUE OF RESPONSE AND FOLLOW-UP

1.10.1 Drills: All practice and training drills of the HAZMAT team must be critiqued in writing.

1.10.2 Actual Incidents: All HAZMAT incidents must be critiqued in writing.

1.10.3 Content of the Critique: After each drill and actual incident involving anhydrous ammonia, the incident commander and/or operations manager must write, sign, and date a comprehensive critique within 48 hours. This critique must discuss in detail the high points, low points, successes and failures encountered. The summary paragraph must state clearly any changes or improvements needed in this plan and plant operating procedures.

1.11 PERSONAL PROTECTIVE AND EMERGENCY EQUIPMENT

1.11.1 Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:
Location Job Function Level of Protection
Contaminated HAZMAT Team B/A Area
Decontamination HAZMAT Team B
Area HAZMAT Team Members B
HAZMAT Paramedics B
Support Area Incident Commander D
Safety Manager D
Operations Manager D
Boston Firefighters (As designated by Commanding Officer on Scene)

1.11.2 Specific Protective Equipment for each level of protection is as follows:

a. **Level B Protection:**
Positive pressure SCBA with composite cylinder
Tyvek/Saranex 23-P disposable full-body OSHA Response Suit
Duct tape
Neoprene chemical safety boots
Latex examination glove (inner)
Butyl rubber outer gloves

b. **Level D Protection:**
Hard Hat
Safety Glasses or Monogoggles
Hearing Protection
*Half Face Respirator with Composite cartridges Work Uniform

*Butyl Rubber Gloves
Safety Shoes or Chemical Safety Boots
The * denotes optional ppe.

c. **Level T Protection:**
To be determined by the fire officer in charge
NO CHANGE TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE PLANT SAFETY MANAGER AND THE INCIDENT COMMANDER.

1.11.3 Limitations of the Personal Protective Equipment and Human Performance:

a. **Contact lens must never be worn where there is the potential for ammonia exposure to the eye.** This is why insert safety glasses are specified for SCBA users whenever they need corrective lenses to perform job tasks. Prescription safety glasses or monogoggles must be worn by non SCBA users exposed or potentially exposed to ammonia.

b. SCBA units have a nominal time rating for breathing air in the bottle of 30 minutes. Air is used going to and returning from the Exclusion Zone. The metabolic load varies from person to person. **Therefore, never remain in the contaminated areas breathing air more than 15 minutes.**
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c. The Tyvek/Saranex 23-P material used in the single use disposable OSHA response suits has a break through time of 19 minutes for exposure to anhydrous ammonia. Therefore, **never remain exposed to anhydrous ammonia for more than 15 minutes.** If more time is needed to stop the leak and affect repairs, then a second team must enter or the first team must retire to the decontamination area. There they will don fresh suits and replace the SCBA bottles before reentry.

d. Neither levels B nor D provide heat, fire, or explosion protection. **Therefore, never enter a contaminated area if the anhydrous ammonia concentrations are at or between the LEL and UEL.** Defensive tactics only will be used until the area is adequately ventilated below the LEL.

e. Functioning in Level B protection places a tremendous heat load on the team members. Before donning ppe the following vital signs will be measured and recorded:
(1) Oral Temperature
(2) Blood Pressure
(3) Pulse
If any of these values are outside acceptable limits relative to each team member's normal values, then that team member will be excluded from entry into the Exclusion Zone.

1.11.4 Transportation, Distribution, and Location of Personal Protective and Emergency Equipment and Apparatus:
Figure A-1 notes the location of all HAZMAT ppe, fire extinguishers, and fire hose/standpipes.

1.11.5 Maintenance and Certification of all Personal Protective and Emergency Equipment and Apparatus:
a. The plant safety manager and incident commander are designated to service, maintain, and certify all ppe, emergency equipment, and apparatus used in this plan.

b. Complete and proper records of ppe fit testing (if necessary), maintenance and certification for emergency; and fire fighting equipment shall be maintained by the plant safety manager.

c. The operations manager, plant safety manager, and incident commander must be continually updated on the availability and readiness of all PPE, emergency equipment, and apparatus. Contingency plans must be developed immediately if key PPE, emergency equipment, or apparatus is unavailable or temporarily out of service.

4.12 **APPROVALS**

_____

CEO Date

_____ _____

Vice President Date

_____ _____

Operations Manager Date

_____ _____

Safety Manager Date

1.11.5 Maintenance and Certification of all Personal Protective and Emergency Equipment and Apparatus:
a. The plant safety manager and incident commander are designated to service, maintain, and certify all ppe, emergency equipment, and apparatus used in this plan.

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4.12 **APPROVALS**

CEO	Date
	7-23-14
Vice President	Date
	7-23-14
Operations Manager	Date
Gary Hardin	7/23/14
Safety Manager	Date

Stavis Seafoods, Inc.

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM

INCIDENT INVESTIGATION PROCEDURES

STAVIS SEAFOODS, INC.

Incident Investigation Form

Incident Summary

Provide Requested Information as Applicable:

Date of Incident: _____ Time of Incident: _____

Location of Incident: _____

How was Ammonia Detected: _____

Who Investigated: _____

Ammonia Concentration (ppm):

Total Quantity of Ammonia Released (lbs):

Duration of Ammonia Release:

Primary Source of Release (Check one if applicable):

[_] Compressor	[_] Evaporative Condenser	[_] Charging Connection/Transfer Hose
[_] Pressure Vessel	[_] Pump	[_] Flange, Joint, or Fitting
[_] Heat Exchanger	[_] Piping	[_] Other (Specify):
[_] Air-Cooling Evaporator	[_] Relief Valve	

Describe any Actions Taken:

Incident Consequences (Check any that apply):

[___] Ammonia release above 100 lbs	[___] Equipment, Property or Product Damage	[___] Near Miss
[___] Injuries or Fatalities		[___] Other (Specify):
[___] Release from Relief Valve	[___] Fire or Explosion	[___] None

Note: Fill out pages 2 and 3 if any consequences in the previous table occurred. If "None" of these consequences apply, skip pages 2 and 3.

Incident Description

Release Impacts (Provide re quested information):

Impact	Workers	Public Responders	Public
Number of Deaths:			
Number of Injuries:			
Number Evacuated:			
Number Sheltered-In-Place:			
Equipment, Property or Product Damage ($):			

Environmental Damage (Check any that apply):

[_] Fish or Animal Kills [_] Tree, Lawn, Shrub, or Crop Damage [_] Water Contamination	[ ] Soil Contamination [ ] Other (Specify):

Notification of Off-Site Emergency Responders (Check the one that applies):

[_] Off-Site Responders Notified But Did Not Respond
[_] Off-Site Responders Notified and Responded
[_] Off-Site Responders Not Notified

Describe What Happened Including Circumstances Leading up to Incident:

Describe the Factors that Contributed to the Incident:

Incident Follow-Up

Factor(s) that Contributed to the Incident (Check any that apply)

[_] Equipment	[_] Maintenance Activity / Inactivity	[_] Management Error
[_] Human Error	[_] Process Design	[_] Power Failure
[_] Improper Procedures	[_] Unsuitable Equipment	[_] Inadequate Administrative Controls
[_] Over pressurized Equipment	[_] Unusual Weather Condition	[_} Inadequate Labeling
[_] Process Upset		[_] Other:_____
[_] By-Pass Condition		

Corrective Actions Needed:

Recommendation	Date Completed

List of Incident Investigation Team Members (List Team Leader First):

Name	Title	Company

Documentation of Meetings Conducted to Review the Incident Investigation:

Name	Title	Company	Review Date

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AMMONIA REFRIGERATION MANAGEMENT PROGRAM

REFRIGERATION SYSTEM CHANGE PROCEDURES

STAVIS SEAFOODS, INC.

Refrigeration System Change Form

A. Describe the Change

Describe the change, attaching drawings and other documents as applicable:

B. Update the Ammonia Refrigeration Management Program (document items that may need to be updated)

Item	Question	Required (Yes/No)	Recommended Action/Comments	Date Completed
	Safety Information			
	Material Safety Data Sheets (MSDS) obtained?			
	Ammonia inventory updated?			
	Refrigeration flow diagrams updated?			
	Facility plan view updated?			
	Equipment list updated?			
	Desired system operating ranges updated?			
	Safety systems updated?			
	Relief system design updated?			
1	Ventilation system design updated?			
	Installation, Operation and Maintenance (IOM) Manuals obtained?			
	Manufacturer data reports obtained?			

Item	Question	Required (Yes/No)	Recommended Action/Comments	Date Completed
	Operating Procedures			
	Operating procedures updated?			
	System logs updated?			
	Safe work practice updated?			
	Preventive Maintenance Program			
	Preventive maintenance program updated?			
	Emergency Response Program			
	Emergency response program updated?			
	Training Program			
	Training completed for system operators?			
	Training completed for mechanics?			
	Training completed for emergency response personnel?			
	Hazard Review			
	Hazard review updated?			
	Recommendations from the hazard review addressed?			

C. Fill out the Pre-Start-Up Checklist (Fill out prior to start-up)

	Question	Required (Yes/No)	Recommended Action/Comments	Date Completed
	Pre-Start-up Checklist			
	Equipment and lines properly labeled?			

	Question	Required (Yes/No)	Recommended Action/Comments	Date Completed
	Rooms that contain ammonia labeled?			
	Do lines contain appropriate hangers or supports?			
	Equipment pressure /vacuum tests completed?			
	All equipment and spare parts appropriate for this ammonia refrigeration service?			
	Appropriate gaskets installed and flange bolts properly torqued?			
	Drain and vent valves located to minimize damage or injury due to leakage?			
	Drain and vent valves capped?			
	Valves can be safely accessed during normal or emergency conditions?			
	Are lines insulated?			
	Unused piping removed?			
	Can equipment be locked out properly?			
	Motor rotations checked?			
	Drive shafts properly aligned?			
	Equipment adequately secured?			
	Correct relief devices installed?			
	Instruments, controls, interlocks and alarms calibrated and/or tested?			

	Question	Required (Yes/No)	Recommended Action/Comments	Date Completed
	Conduits been sealed?			
	Covers securely fastened to all electrical panels and junction boxes?			
	Vessels contain visible ASME nameplates?			

D. Provide Approval to Start-Up System (Sign and date to approve start-up)

Ammonia Refrigeration Management Program Manager (or Designee)	
Print Name:	Date:

Ammonia Refrigeration Management Program (ARM) Review Checklist

Stavis Seafoods, Inc.
7 Channel Street
Boston, MA 02210

Person (s) conducting review:_____

Date:_____

Item	Question	Yes	No	NA	Recommended Action/Comments	Date Completed
1.0	**Management System**					
1.1	Have the person(s) responsible for the program been identified?	X				9/2/13
1.2	Are these persons committed to the program?	X				9/2/13
1.3	Are the system operators involved in the program?	X				9/2/13
1.4	Have program reviews been conducted on a regular basis?			X		
1.5	Were recommendations from the previous program review addressed?			X		
2.0	**Refrigeration System Documentation**					
2.1	Are Material Safety Data Sheets (MSDS) available?	X				9/1/13
2.2	Has the ammonia inventory been documented?	X				
2.3	Has the facility developed representative refrigeration flow	X				9/7/13
2.4	Has the facility developed a representative facility plan view?	X				9/2/13

2.5	Has an up-to-date equipment list been prepared?					
2.6	Have the desired system operating ranges been documented?					
2.7	Have the safety systems been documented?					
2.8	Has the relief system design been documented?					
2.9	Has the ventilation system capacity been documented?					
2.10	Are Installation, Operation and Maintenance manuals available?					
2.11	Are manufacturer data reports (U1, U1A forms) available for pressure vessels?					
3.0	**Operating Procedures**					
3.1	Have lines, emergency isolation valves, and safety systems been labeled?					
3.2	Have standard operating procedures been written?					
3.3	Do system operators have a copy of the standard operating procedures?					
3.4	Are refrigeration logs being maintained?					
3.5	Are procedures for the use and care of PPE being followed?					
3.6	Are confined space entry permit procedures being followed?					
3.7	Are lockout/tagout procedures being followed?					
3.8	Are hot work permit procedures being followed?					
3.9	Are security procedures being followed?					

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4.0	**Preventive Maintenance Program**					
4.1	Has an up-to-date list of equipment included in the program been developed?					
4.2	Are the tests and inspections conducted sufficient to maintain the equipment and prevent hazards?					
4.3	Are preventive maintenance activities documented?					
5.0	**Contractor Program**					
5.1	Has an up-to-date list of contractors included in the program been developed?					
5.2	Have all contractors on the list been screened using the contractor evaluation form?					
5.3	Are the contractors following the facility's safety and security procedures?					
6.0	**Emergency Response Program**					
6.1	Has an emergency action plan been developed?					
6.2	Have employees been trained on the emergency action plan?					
6.3	Have procedures been developed to respond to ammonia releases?					
6.4	Have the NRC and other agencies been contacted when there were ammonia releases					
6.5	Have emergency response drills been conducted?					
6.6	Has the emergency response program been coordinated with off-site responders?					

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7 Channel Street
Boston, MA 02210

7.0	**Incident Investigation Procedures**					
7.1	Have ammonia odor complaints been investigated?					
7.2	Have formal incident investigations been conducted for serious ammonia incidents?					
7.3	Have corrective actions identified during investigations been addressed?					
7.4	Have the results of investigations been reviewed with affected employees?					
8.0	**Training Program**					
8.1	Has awareness training been completed for all affected employees?					
8.2	Has training been completed for all system operators?					
8.3	Has training been completed for all personnel who provide maintenance or repairs on the system?					
8.4	Has training been completed for all contractors?					
8.5	Has training been completed for all personnel who respond to ammonia releases?					
8.6	Has refresher training been conducted?					
8.7	Is the training documented?					

9.0	**Hazard Review Procedures**					
9.1	Was a hazard review conducted?					
9.2	Were the recommendations from the hazard review addressed?					
10.0	**Refrigeration System Change Procedures**					
10.1	Was a refrigeration system change form completed for all changes to the ammonia system that resulted in a change to the system documentation?					
10.2	Has the Ammonia Refrigeration Management Program been updated to reflect these changes?					
10.3	Was the hazard review updated to reflect these changes?					
10.4	Were recommendations listed on the pre-start-up checklist addressed?					
10.5	Have all refrigeration system change forms been signed by the program manager (or designee) before changes have have been made					